

The Impact of Reflections on Student Achievement

By Alexandra Howry

**Submitted in Partial Fulfillment of the Requirements for the
Degree of Master of Education**

May 2017

Graduate Programs in Education

Goucher College

Table of Contents

List of Tables	i
Abstract	ii
I. Introduction	1
Overview	1
Statement of Problem	1
Hypothesis	1
Operational Definitions	2
II. Review of the Literature	3
Definitions of Reflection	4
Benefits of Reflection	5
Recommendations for Reflection	7
Conclusion	8
III. Methods	10
Design	10
Participants	10
Instrument	11
Procedure	12
IV. Results	13
V. Discussion	17
Implications of Results	17
Theoretical Consequences	17
Threats to Validity	18
Implications for Future Research	19
Conclusion	20
References	21

List of Tables

1. t-test outcome by treatment group, Paper 1	14
2. t-test outcome by treatment group, Paper 2	14
3. t-test outcome by treatment group, Reflection 1	15
4. t-test outcome by treatment group, Reflection 2	16

Abstract

The purpose of the study was to assess whether continuous student reflections in a tenth grade, all girls' class impacted student achievement, and if the quality of students' written reflections improved when the students were given more opportunities to reflect. This was an experimental study and involved the use of a pretest/posttest design to compare reflections and students' work. The measurement tool was researcher-created reflections and rubrics. The study took place over three and a half weeks, during which the experiment group received different treatment. The experimental group received continuous reflections, while the control group only received the pretest/posttest reflections. The null hypothesis was accepted, though these results could be attributed to a number of factors and threats to validity. Research should continue in this field and suggestions for future studies are presented.

CHAPTER I

INTRODUCTION

Overview

Reflection, and specifically written reflection, allows students to make connections and develop their ideas for better understanding (Ziegler & Montplaisir, 2012). While reflection is a skill not limited to the classroom, the question under consideration in this research paper is whether reflection can impact student academic performance. Reflection has been shown to have positive impacts on student learning, helping them become self-regulated learners (Harvey, Coulson & McMaugh, 2016). Dewey (1955) was one of the first educational thinkers to define reflection and its benefits. With an abundance of research on reflection done since his time, this study hopes to add to the already growing number of research done on reflection.

Reflection is especially useful during transitional times in a person's life, and can help the transition be more successful (Warburton & Volet, 2012). The participants in this study were high schoolers, close in age to the pivotal transition to adulthood. With high academic performance increasingly stressed at younger ages, reflection can be a beneficial tool to help students improve their academics and become better learners.

Statement of Problem

The purpose of the study is to assess whether continuous student reflections impacts student achievement, and if the quality of students' written reflections improve when they were given more opportunities to reflect.

Hypothesis

The null hypotheses is that mean scores do not differ between control and experimental populations for either papers or reflections.

Operational Definitions

For this study, the term *student reflection*, or simply *reflection*, will be used frequently.

Student reflection refers to a hand-written reflection a student wrote in class under the researcher's supervision.

Student achievement, student work, paper, or four-paragraph analytical essay will be used interchangeably and refer to a four paragraph analytical essay participants were assigned. The participants in this study submitted two different essays, or papers, that were used to determine whether student achievement was impacted.

Continuous reflection means at least one to three reflections are completed by the experiment population each week in between the two papers' submission.

CHAPTER II

REVIEW OF THE LITERATURE

Student reflections are a teaching practice that is increasingly being used in classrooms today (Moon, 2006; Dees, Moore & Hoggan, 2016; Harvey, Coulson & McMaugh, 2016). Studies on the efficacy of reflection are prolific (Harvey, et al., 2016) as well as studies that use student reflections as a method for data analysis (Nakayama, Mutsuura & Yamamoto, 2016; Andiliou & Murphy, 2014). Student reflection is also not limited to an age or course subject. Reflection has been used in higher education courses (Andiliou & Murphy, 2014; Dees, et al., 2016), chemistry classes (Han, Li, Sin & Sin, 2014), English as a Second Language (ESL) intervention strategies (Bell, Kelton, McDonagh, Mladenovic & Morrison, 2011), as an assessment tool (Nakayama, et al., 2016; Ziegler & Montplaisir, 2012), and even in teaching adults (Brookfield, 1985). However, with this widespread use, there is a need to review the literature in order to define reflection, extrapolate its benefits and recommend its future uses inside and outside of the classroom.

While reflective practice studies have a long history, a review of the literature reveals there is a lack of consensus on the actual definition of “reflection” (Moon, 2006; Bell, et al., 2011; Harvey, et al., 2016). However, even with inconsistent definitions, each definition builds upon the idea that reflection is a step further than thinking. Reflective thinking involves a conscious effort, and creating intelligent action from beliefs based on evidence (Dewey, 1955). Additionally the literature provides a plethora of benefits for using reflection, whether it is through self-directed learning, a learning journal, or simply as a classroom device to enhance

student thinking. To conclude, recommendations are made for future uses of reflection that are evidence-based in previous studies.

While reflection has been studied abundantly over the years, the purpose of this literature review is to provide a synopsis as to what is considered reflection, why it is used and how it could be used based upon a collection of recent and seminal works.

Definitions of Reflection

To begin, it would be productive to establish exactly what constitutes a reflection, or reflective thinking. One of the seminal writers on reflection was Dewey (1955) and in his work *How We Think* defined reflective thinking as an active, persistent, and careful consideration of any belief that is founded in evidence. Evidence and rationality are stressed factors in reflective thinking that makes it different from a belief or ordinary thought. Despite an abundance of research since Dewey's time, the concept of reflection has been used inconsistently or defined differently by different authors (Harvey, et al, 2016). Bell, et al. (2011) calls reflection highly subjective, and questions whether it is appropriate to assess reflections at all. Even with an abundance of research, they believe it is still highly subjective, and more needs to be done in order to create a cohesive definition.

A simplistic way to define reflection is to view reflection as another form of thinking that is used to achieve an outcome (Moon, 2006). Calling this the “commonsense view of reflection,” Jennifer Moon also agrees that there are multiple definitions of reflection. Nonetheless, she views reflection as the link between metacognitive knowledge and self-regulation—two key factors in the learning process. In other words, reflection is an “active process” (Moon, 2006, p.

26). This “commonsense view of reflection” is echoed by other researchers who define reflection as “a collaborative way to put our best ideas into action” (Dees, et al., 2016, p. 11).

Reflection can also be defined in levels, ranging from shallow reporting to a deeper and critical level (Harvey, et al., 2016). Critical reflection is related to metacognition, but also transformative learning. Metacognition is often referred to as “thinking about thinking” (Jaleel & Premachandran, 2016), and what reflection does is interrupts a student’s automated behavior and assists them in recognizing a problem, as well as increases their agency and motivation (Kelly, 2015). In that sense, reflective thinking can be transformative since it helps students recognize and solve their own problems.

With multiple definitions of reflection, picking one is a contentious issue. Whether it is Dewey’s definition of thought based on evidence and rationality, or the “commonsense” view of reflection that uses thinking to discover an outcome, reflection is a deeper level of thinking about oneself (Mezirow, 1985). With each different definition of reflection, it is clear that it is beneficial for students, and learners of all ages, to reflect. Whether you physically or mentally stop your automated behavior, think more about your thinking, or simply report back an experience, the definitions of reflection imply several benefits.

Benefits of Reflection

Researchers have stated numerous benefits of reflection, and many involve the benefits of processing information, or metacognition (Ziegler & Montplaisir, 2012; Jaleel & Premachandran, 2016). While reflective thinking can be synonymous with critical thinking, or metacognitive knowledge, reflection does involve some form of evaluation (Brookfield, 1985). In that sense, all age groups benefit from reflection because it creates efficient independent

learners (Jaleel & Premachandran, 2016). Reflection encourages learners to take control of their learning needs, as well as facilitate decision-making processes, promoting their professional development, problem solving, and lifelong learning (Han, et al., 2014; Kelly, 2015).

Mezirow (1985) highlights the central role of psychoanalytic therapy in self-reflective learning. Since self-reflective learning is “appraisive rather than prescriptive or designative” (p. 21), it helps develop a schema for existential dilemmas that happen later in life such as a change in job, divorce, or death of a loved one. Moon (2006) also mentions the effectiveness of reflective thinking in therapy journals. In the study, she mentions how therapy journals engaged patients’ forethought, and they wrote out what they would do in the future when some triggering event or emotion happened again. The study found great success in therapy journals, and it is due to the rehearsal and critical thinking reflection writing utilizes. Reflection is therefore not just beneficial in the classroom, but a valuable life skill (Bell, et al., 2011).

In their study, Ziegler and Montplaisir (2012) used portfolio-based assessment (PBA) in a biology class and analyzed student reflections to support PBA’s implementation in the classroom as a way to improve student achievement and critical thinking. In the student reflections, the researchers found that students were tying content from class to personal experiences and using outside resources to supplement their understanding. This suggests that reflection helps students become self-directed learners. Students take charge of their own learning, and gain a stronger sense of independence and autonomy than in other learning contexts (Brookfield, 1985). The study found that PBA, and reflection writing, improved student achievement and increased critical thinking on biology concepts. In sum, reflection ultimately contributed to better student understanding.

In a study assessing a pharmacy and health sciences undergraduate degree program, Han, et al. (2014) tested the effectiveness of a reflective writing intervention on developing better knowledge, critical thinking and application skills in students. Their study showed positive results and recorded increased student engagement. They prefaced their study that “reflective writing is a pedagogical strategy that can increase critical thinking in students,” and found statistically significant differences between the control and treatment groups, with higher achievement in the treatment group (p. 46).

In conclusion, reflective thinking and writing has been shown to improve student achievement and facilitate self-directed learning. Reflection promotes efficient independent learning and fosters forethought (Jaleel & Premachandran, 2016; Moon, 2006). Reflection is not limited to age, subject, or context, and shows benefits to students and learners in each case.

Recommendations for Reflection

With the numerous benefits of reflection, it is recommended that reflection should be incorporated, or taught in adjunct, with other lessons in a classroom. A key quote to remember about reflection is that “not all learners reflect, but most can learn to reflect” (Harvey, et al., 2016, p. 3). If reflective practices can be taught, it can in fact be learned as well (Dewey, 1955) and activities that encourage a reflective and purposeful stance towards learning should be embedded regularly into the classroom (Jaleel & Premachandran, 2016; Warburten & Volet, 2012).

In a study done on first year undergraduates, Warburten and Volet (2012) found that “short reflections were a simple and non-threatening way of helping students think about and hopefully further develop their learning skills” (p. 20). Furthering their study, reflective activities

help students focus on learning and keep them engaged and motivated (Jaleel & Premachandra, 2016).

Support in the beginning, including modeling and feedback, is encouraged when teaching reflective practices (Warbuton & Volet, 2012; Kelly, 2015). Additionally, reflections across units of study could further enhance self-direction in learning. When students can generalize their reflections to other subjects in school, it fosters self-awareness, which is essential in becoming an effective, self-directed learner.

The purpose of reflection is to increase metacognitive thinking and question a person's epistemology, if not eventually shift their beliefs. Using reflection frequently, across contents, and embedding it into regular instruction are the recommendations for incorporating reflection into the classroom. Reflective thinking is not always automatic to learners, so supporting students in the beginning will help them engage in deeper thinking. However, reflection does not need to be limited to the classroom (Moon, 2006). Independent reflection also has the same benefits of creating effective problem-solving schemas, and helping people process significant life events. In sum, reflection creates autonomous adults that are able to think critically and effectively solve life problems.

Conclusion

Student reflections are a tool that can be used inside and outside of the classroom to engage students and learners in more meaningful thinking. A review of the literature has shown that reflection has multiple benefits, one which is the promotion of self-directed learning. Even though there are multiple definitions of reflection, and lack of consensus amongst researchers, reflection is still a beneficial tool to use with students and adults. A summative definition of

reflection is a form of thinking based on evidence with the purpose of producing a certain outcome (Dees, et al., 2016; Dewey, 1955; Mezirow, 1985). It is usually based on evidence or metacognitive thinking, but whichever definition is chosen, the benefits of incorporating reflection into teaching have proven to increase student achievement (Han, et al., 2014; Ziegler & Montplaisir, 2012).

CHAPTER III

METHODS

Design

The purpose of the study was to assess whether continuous student reflections impacted student achievement, and if the quality of students' written reflections improved when they were given more opportunities to reflect. This was an experimental study including an experiment and a control group.

The experiment and control groups were treated differently in the design of the study. The experiment group received one to three written reflection prompts per week, along with two baseline reflections that were completed after they submitted a four paragraph analytical essay assignment. The control group only received the two baseline reflection prompts that were completed with the submission of their papers. The two baseline reflections, along with the papers the students submitted constituted the pre- and post test assessments. The only reflections assessed for both groups were the two reflections that corresponded to the essay assignment, and the only student work used to determine improvement was the two essays. The study was conducted within a three and a half week time frame.

Participants

The study used a convenience sample of students in two different a tenth grade World History course periods where the researcher was student teaching. The school is an all-girls charter school in the mid-Atlantic region. The experiment group and control groups were chosen because of their similar class sizes and the classes similar academic abilities shown thus far in the school year. Both the experiment and control group consisted of 18 students between the ages of 15 and 18 years old.

The school requires three years of two-semester history courses to be eligible for graduation. The World History course is the second two-semester course in the school's curriculum. Students are required to pass this course before moving onto the last year of required history. If a student does not receive a passing grade, the student retakes this course, which was the case for three of the participants in this study (two were in the control group, one was in the experimental group). The school, and all of its students, are eligible for Title I services.

For the study, fourteen students from each class were selected after data collection to have their essays and reflections assessed. Seven high/middle achieving students were chosen from both the experimental and control group, and seven low achieving students were chosen from both groups. This was to ensure that there was a representative sample in the study. In total, twenty-eight students were used for this study.

Instrument

For this experiment, the researcher created each of the reflection prompts. Reflections related to class assignments, test performance, or course understanding. Reflection prompts included two to four reflection questions and a lined page for the students' responses. Reflection questions on the prompt varied, including backward, inward, outward, and forward reflection questions on their assignments.

Additionally, the researcher created four paragraph analytical essay assignment and the rubric used for assessing the papers. The rubric consisted of ten elements that were scored on a scale of 1 to 4 points, for a total score of 40 points being the highest score. The researcher used a prescribed reflection rubric from their adviser to determine reflection scores. The rubric graded reflections on a scale of 0 to 4 points, with 4 being an exemplary reflection.

Procedure

The first reflection was given with the second writing assignment the students had turned in that school year. The experimental and control group were given the reflection the day they turned in their paper. Students were instructed to read the prompt, answer the questions fully and take five minutes to write as much as they could in silence. Once they wrote as much as they could, students were told to raise their hands so the teacher would collect the reflection, and were then instructed to wait quietly while their classmates finished writing. A timer was used each time to ensure the same amount of time was given for each reflection and silence was enforced during those five minutes. The experiment group then continued to receive one to three reflections weekly until they turned in their next four-paragraph paper assignment. Students completed their written reflections independently, and then turned it in for the researcher's assessment.

The researcher copied students' paper so they could be scored using the same rubric. Seven high/middle achieving students and seven low achieving students were then selected after data collection was completed to have those students' scores count towards the data population.

CHAPTER IV

RESULTS

The study examined whether continuous reflection would impact student achievement by comparing two four-paragraph analytical essays completed for a tenth grade history class. The study also examined whether continuous reflection, or providing more opportunities to reflect, would improve the quality of the reflections. The null hypothesis states that there would be no difference in mean scores between the experimental and control populations either on their papers or reflections.

To see if academic achievement was impacted by continuous reflection, a *t*-test was done comparing the experimental and control group paper scores, on both the first paper and the second. All *t*-tests were done using the Stata 13.1 for MAC package. The *t*-test determined that there was no significant difference found between the experiment and control groups for either paper (p-value never < 0.05). See Table 1 for the outcome variables by treatment group for Paper 1, the baseline data. This table shows the alternate hypothesis ($H_a: \text{diff} \neq 0$) with corresponding p-value. Typically if $p < 0.05$, there is a 95% confidence that there is a real difference between the populations means. However, the p-values corresponding to the alternate hypothesis is greater than 0.05 ($p=0.1897$), meaning that for Paper 1, there is not a significant difference between the experiment and control group population means. Table 2 shows the *t*-test results for Paper 2, which also did not show any significant differences between the two groups ($p=0.5490$). The null hypothesis (H_o) is accepted since the p-value for the alternate hypothesis (H_a) was never less than 0.05. This means that continuous reflection for the experiment group did not show a significant impact on student achievement, as seen in the p-values of both groups.

Table 1: Table 1: T-test outcome by treatment group, Paper 1

```
. ttest PAPER1, by(Exp_Con)
```

Two-sample t test with equal variances

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf. Interval]	
exp	14	18.39286	2.994582	11.2047	11.92346	24.86226
con	14	23.5	2.32698	8.706761	18.47287	28.52713
combined	28	20.94643	1.924559	10.18381	16.99756	24.8953
diff		-5.107143	3.792408		-12.90255	2.688264

diff = mean(exp) - mean(con) t = -1.3467
 Ho: diff = 0 degrees of freedom = 26

Ha: diff < 0 Ha: diff != 0 Ha: diff > 0
 Pr(T < t) = 0.0949 Pr(|T| > |t|) = 0.1897 Pr(T > t) = 0.9051

Table 2: T-test outcome by treatment group, Paper 2

```
. ttest PAPER2, by(Exp_Con)
```

Two-sample t test with equal variances

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf. Interval]	
exp	14	21.71429	2.224807	8.324464	16.90788	26.52069
con	14	24	3.036409	11.3612	17.44024	30.55976
combined	28	22.85714	1.85999	9.84214	19.04076	26.67353
diff		-2.285714	3.764246		-10.02323	5.451803

diff = mean(exp) - mean(con) t = -0.6072
 Ho: diff = 0 degrees of freedom = 26

Ha: diff < 0 Ha: diff != 0 Ha: diff > 0
 Pr(T < t) = 0.2745 Pr(|T| > |t|) = 0.5490 Pr(T > t) = 0.7255

To see if the quality of reflections improved when one group was given more opportunity to reflect, a *t*-test was done on the first reflection and the second reflection. Remember, the first reflection was written at the same time participants submitted their first paper, and the second

reflection was written with the submission of their second paper three and a half weeks later.

Table 3 shows that for reflection 1, the baseline data, there was no significant difference between the two groups mean scores (Ha: $\text{diff} \neq 0$ and corresponding $p\text{-value} = 0.4637$). This means that both experimental and control groups reflection scores were similar to begin with at the beginning of the study. Table 4 shows the t -test results of the second reflection. Again, the p -value for the alternate hypotheses is greater than 0.05 ($p = 0.7115$), meaning there was no significant difference found between the two groups. The data shows that continuous reflection based on the samples used in this action research study does not have a significant impact on the quality of the reflection.

In sum, the differences observed between the samples are merely normal sampling fluctuations. There was not enough evidence to overturn the null hypothesis for student achievement (the two papers) or continuous versus non-continuous reflection (the two reflections). The null hypothesis is therefore accepted and no significant data was found.

Table 3: T-test outcomes by treatment group, Reflection 1

. ttest REFL1, by(Exp_Con)

Two-sample t test with equal variances

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf. Interval]	
exp	14	2	.2344036	.877058	1.493602	2.506398
con	14	1.714286	.3043381	1.138729	1.056803	2.371768
combined	28	1.857143	.1904762	1.007905	1.466318	2.247968
diff		.2857143	.3841441		-.5039053	1.075334

diff = mean(exp) - mean(con)

t = 0.7438

Ho: diff = 0

degrees of freedom = 26

Ha: diff < 0

Ha: diff != 0

Ha: diff > 0

Pr(T < t) = 0.7682

Pr(|T| > |t|) = 0.4637

Pr(T > t) = 0.2318

Table 4: T-test outcome by treatment group, Reflection 2

. ttest REFL2, by(Exp_Con)

Two-sample t test with equal variances

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf. Interval]	
exp con	14	2.142857	.2058791	.7703289	1.698082	2.587632
	14	2.285714	.3218861	1.204388	1.590322	2.981107
combined	28	2.214286	.1879797	.9946949	1.828583	2.599988
diff		-.1428571	.3820954		-.9282654	.6425511

diff = mean(exp) - mean(con) t = -0.3739
Ho: diff = 0 degrees of freedom = 26

Ha: diff < 0 Ha: diff != 0 Ha: diff > 0
Pr(T < t) = 0.3558 Pr(|T| > |t|) = 0.7115 Pr(T > t) = 0.6442

CHAPTER V

DISCUSSION

The purpose of the study was to assess whether continuous student reflections impacted student achievement, and if the quality of students' written reflections improved when they were given more opportunities to reflect. Student achievement was determined by two four-paragraph analytical papers that were written for a history class where the researcher was student teaching. The null hypothesis, that mean scores would not differ between control and experimental populations for either papers or reflections, was accepted. The scores show no significant difference before or after reflection began, and variations were most likely due to normal sample fluctuations.

Implications of Results

The implication of the results is that there is not sufficient data to suggest a statistical difference between my experiment or control groups. In assessing whether student achievement was impacted by reflection, the experiment group showed no difference from my control group at the completion of their second paper. Additionally, the data showed no statistical significance between reflection scores by their second reflection, even though one group had received continuous reflection for the past three and a half weeks.

Theoretical Consequences

Since the results yielded insignificant results, this could lead to conclusion that reflection does not impact student achievement. However, this would be inaccurate due to the multitude of studies that have shown the benefits of reflection writing and how it leads to deeper

understanding (Dewey, 1953; Moon, 2004; Ziegler & Montplaisir, 2012; Jaleel & Premachandran, 2016, Steiner, 2016).

This study had several threats to validity, which will be discussed in the following section, and those greatly impacted this study's ability to have significant findings or extrapolate on the impact of reflections on student achievement.

Threats to Validity

This study had several threats to validity that could have affected the fact that this study did not find any statistical significance. One of the first is the constrained timeframe this study took place. Due to factors beyond the researcher's control, only three and a half weeks were allotted to gather data for this study. Looking for a change in academic writing within such a short time frame is unfeasible, and should be examined allowing for at least a month or two of treatment before examining results.

The sample was also threatened due to poor attendance in the experiment group. Of the 18 students that participated in the continuous reflection, only 12 attended class on a regular basis. Their sporadic attendance also affected their submission of assignments. This included the completion and submission of the four-paragraph analytical essays—which were used to assess academic achievement—and the completion of the reflections—which were used to measure reflection growth. Some students in both the control and experiment groups did not turn in the first paper but turned in the second, or turned in the second but not the first. This resulted in inconsistent data and a mean skewed towards zero for both papers and reflections.

The experiment group also had varying behavior during their reflection time. Many students did not see value in reflecting on their work, and simply wrote something on the paper in order to get participation points. There was often talking or other disruptions when students

were supposed to be reflecting quietly and writing as much as possible. Additionally, many participants did not take their time, and wrote very brief reflections in incomplete sentences. The term *continuous reflection* does not imply that the reflection was always *meaningful* to the student.

Another factor that could threaten the validity was that participants were at different reflection levels. While the data does not show any significant differences from the first reflection between the experiment and control groups, both groups were never given a lesson on how to write a good reflection. It might have been beneficial to also teach students how to reflect instead of repeatedly telling them to reflect. The number of reflections a group completed did not seem to make a difference on the quality of reflection, which could imply that repetition is not the only way to improve reflective writing.

There is also a case to be made as to whether reflection can or would impact academic writing. While this study used analytical writing as a means to measure academic achievement, there are few studies done and presented on whether reflection specifically impacts analytical writing. The benefits of reflection are discussed in Chapter II and include enhanced metacognitive skills, but there are many other factors besides reflection that contribute to improved analytical writing.

Implications for Future Research

While this study did not have any significant findings, it can help future research in this area by providing suggestions for future research on reflection. Providing a longer study time, so that a more accurate measure of growth can be assessed would be the first suggestion. While every teacher hopes for short term results, deeper thinking and metacognitive skills require time and practice. However, practice alone should be cautioned. This study emphasized the practice

part, but perhaps a more structured reflection lesson embedded into a study would provide fruitful results. Additionally, providing more options for students, to make reflections more meaningful to them, would be beneficial. Students could take surveys instead of always writing a reflection, or choosing which assignments they reflect on. To ensure the validity of the mean scores, ensuring every student is able to submit every reflection is crucial, as well as the work that is being used to measure academic achievement. Additionally, more research should be done specifically on the connection between reflection writing and analytical writing, to see if there is a significant relationship, or even correlation, between the two.

Conclusion

While this study sought to examine the impact reflections have on student achievement, it also leaves more questions than answers. The purpose of this study was to see if reflection writing could impact student achievement, and also if continuous reflection improved reflection quality. No significant statistical differences were found between the experimental and control groups from the baseline paper and reflection to the second paper and reflection. This led to an acceptance of the null hypothesis and speculations as to the multiple threats to validity this study had. Research into the benefits and pitfalls of reflection writing in the classroom should continue and be given more time to assess for growth.

References

- Andiliou, A., & Murphy, P. K. (2014). Creative solutions and their evaluation: Comparing the effects of explanation and argumentation tasks on student reflections. *Frontline Learning Research*, 5. Retrieved from: <http://files.eric.ed.gov/fulltext/EJ1090883.pdf>
- Bell, A., Kelton, J., McDonagh, N., Mladenovic, R., & Morrison, K. (2011). A critical evaluation of the usefulness of a coding scheme to categorise levels of reflective thinking. *Assessment & Evaluation in Higher Education*, 36 (7): 797-815. Retrieved from: <http://dx.doi.org/10.1080/02602938.2010.488795>
- Brookfield, S. (1985). Self-directed learning: A critical review of research. In S. Brookfield (Ed.), *Self-directed learning: From theory to Practice* (pp. 5-16). San Francisco: Jossey-Bass Inc.
- Dees, L., Moore, E., & Hoggan, C. (2016). Reflective practice and North Carolina's developmental reading and English redesign efforts. *NADE Digest*, 9 (1): 8-12. Retrieved from: <http://files.eric.ed.gov/fulltext/EJ1097536.pdf>
- Dewey, J. (1955). *How we think* (2nd ed.). Boston, MA: D. C. Heath & Company
- Han, N. S., Li, H. K., Sin, L. C., & Sin, K. P. (2014). The evaluation of students' written reflection on the learning of general chemistry lab experiment. *Malaysian Online Journal of Educational Sciences*, 2 (4): 45-52. Retrieved from: <http://www.eric.ed.gov/contentdelivery/servlet/ERICServlet?accno=EJ1086271>
- Harvey, M., Coulson, D., & McMaugh, A. (2016). Towards a theory of the ecology of reflection: Reflective practice for the experiential learning in higher education. *Journal of University Teaching and Learning Practice*, 13 (2): 1-20. Retrieved from: <http://www.eric.ed.gov/contentdelivery/servlet/ERICServlet?accno=EJ1101277>

- Jaleel, S., & Premachandran, P. (2016). A study on the metacognitive awareness of secondary school students. *Universal Journal of Educational Research*, 4 (1): 165-172. Retrieved from: <http://www.eric.ed.gov/contentdelivery/servlet/ERICServlet?accno=EJ1086242>
- Kelly, L. J. (2015). “Does the mirror speak my language?” A comparison of L1 and L2 student reflections on their experiences in a small group writing tutorial. *RELC Journal: A Journal of Language Teaching and Research*, 47 (2): 229-243. Retrieved from: <http://dx.doi.org.goucher.idm.oclc.org/10.1177/0033688215619517>
- Mezirow, J. (1985). A critical theory of self-directed learning. In S. Brookfield (Ed.), *Self-directed learning: From theory to Practice* (pp. 5-16). San Francisco: Jossey-Bass Inc.
- Moon, J. A. (2006). *Learning journals: A handbook for reflective practice and professional development* (2nd ed.). Retrieved from: [http://ebook.umaha.ac.id/E-BOOKS%20ON%20HIGHER%20EDUCATION/STANDARD,%20QUALIFICATION,%20_%20GUIDE%20LINE%20IN%20HIGHER%20EDUC/LEARNING%20JOURNALS,%20A%20HANDBOOK%20FOR%20\[Jennifer%20Moon\].pdf](http://ebook.umaha.ac.id/E-BOOKS%20ON%20HIGHER%20EDUCATION/STANDARD,%20QUALIFICATION,%20_%20GUIDE%20LINE%20IN%20HIGHER%20EDUC/LEARNING%20JOURNALS,%20A%20HANDBOOK%20FOR%20[Jennifer%20Moon].pdf)
- Nakayama, M., Mutsuura, K., & Yamamoto, H. (2016). Student’s reflections on their learning and note-taking activities in a blended learning course. *Electronic Journal of e-Learning*, 14 (1): 43-53. Retrieved from: <http://www.eric.ed.gov/contentdelivery/servlet/ERICServlet?accno=EJ1099318>
- Warburton, N., & Volet, S. (2012). Enhancing self-directed learning through a content quiz group learning assignment. *Active Learning in Higher Education*, 14 (1): 9-22. Retrieved from: <http://journals.sagepub.com.goucher.idm.oclc.org/doi/pdf/10.1177/1469787412467126>

Ziegler, B., & Montplaisir, L. (2012). Measuring student understanding in a portfolio-based course. *Journal of College Science Teaching*, 42 (1): 16-25. Retrieved from:
http://www.nsta.org/publications/browse_journals.aspx?action=issue&thetype=all&id=10.2505/3/jcst12_042_01