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Effect of Teacher-Made Narrative Fiction (TMNF) about Covalent Bonding on Students' Achievement, Retention and Interest

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Abstract

To investigate how science narratives affect learning in Grade 9 Chemistry, specifically on covalent bonding, the authors developed a science narrative fiction. Subsequently, this teacher-made narrative fiction (TMNF) was utilized in order to determine its influence on the achievement, retention and interest levels toward covalent bonding and toward Chemistry, in general. A quasi-experimental pre-test/post-test design was utilized. Results showed that the students exposure to the TMNF can increase levels of achievement, retention and interest in learning covalent bonding and towards Chemistry. They also showed that students have a positive perception toward TMNF. It can be concluded that students can benefit from being exposed to TMNF along achievement, retention, and interest levels; and that, the positive perception of the students is indicative of their enthusiasm towards the use of it. TMNF may be adapted in the classroom together with expository texts and other relevant teaching-learning strategies. School heads and administrators may empower science teachers to create their own narratives by providing an avenue for professional development in line with narrative writing which can lead to the creation of a shared resource for the teaching-learning community.

KEYWORDS

Teacher-Made Narrative Fiction
Covalent Bonding
Grade 9 Chemistry
Student Achievement
Retention and Interest

Introduction

Reading stories can be considered as one of the most enjoyable parts of learning, especially in the childhood years. However, to some children, the love of reading fades with maturity. This probably comes with the realization that reading is no longer a relaxing activity, but rather, a tedious, academic one. According to Reuer (2012), the gradual replacement of stories that are personally relevant, with concise, precise, factual collections meant to expedite the learning process may be the reason for the slow erosion of enjoyment from reading. For many older students, learning becomes synonymous with memorization and their natural curiosity is buried under mounds of 'important' facts.

Reading has always been present in the science curricula as learners are required to read a variety of text that accounts for various purposes. Most often, science learners are exposed to science texts that are concise, precise, and are sometimes

devoid of human interest meant to accelerate the learning process. However, international research suggests that students' interest in science could be heightened if curricula and assessment requirements allow for students to learn science as a story involving people, situations and actions, real world situations that students can engage with, especially that people naturally use their imaginations and are attracted to good stories and historical accounts. Moreover, it is recommended that teaching science should become more contextual such that students can find more meaning and personal relevance in their science education (Ainly, 2006; Metz et al., 2006; Klassen, 2009).

Chemistry, as a part of school science, requires intensive reading on the part of the learner; and because it is mostly abstract, it is often regarded as a difficult subject. This abstract nature along with other content learning difficulties means that chemistry classes require a high level skill set and that success in chemistry involves imagination, organization, and critical thinking on the part of the teachers and students. As such, high school chemistry teachers should be prepared to teach and reinforce basic science and mathematical skills, as well as critical reading and writing skills. This is best done by helping learners make connections between their prior knowledge and their new understanding, especially that a real understanding demands bringing together of conceptual understandings in a meaningful way (Taber, 2002; Sirhan, 2007; American Chemical Society [ACS], 2012; Woldeamanuel et al., 2014).

In the Philippine setting, chemistry is taught in all junior high school grade levels with increasing complexity. Chemistry topics are subdivided in each grade level and are taught for a quarter of a school year. This study looks into the Chemistry taught in the Grade 9 level which includes chemical bonding, the variety of carbon compounds, and the mole concept. Specifically, the study makes use of the concept of covalent chemical bonds as it was identified as a critical content among learners. Covalent bonding is considered difficult because it generally covers abstract concepts and it usually takes longer time to teach due to its concepts of polarity. Moreover, most literature in science education have focused on students' understanding of all types of chemical bonding, rather than focusing on a specific type of chemical bonding. The aim of chemistry education is not only to provide students all knowledge related to chemistry, but also to help them clearly understand the basic concepts and the connections among them (Goh & Chia, 1992; Atasoy et al., 2003; Unal et al., 2010). Thus, this study focused on covalent bonding.

In recent years, the use of narratives was seen by some educators to be helpful in science education such that theoretical and methodological foundations for constructing and using stories in science teaching are beginning to be established (Klassen, 2009). Narratives help contextualize science and may help lead to an enhanced and more meaningful learning, aside from promoting reading. Narratives are an old tradition built upon the human need to "make meaning and forge connections between seeming disparate bits of knowledge and experience" in human culture. It is a form of discourse, whether oral or textual, which tells a story. A narrative can employ numerous literary strategies such as foreshadowing, punctuated timelines, and metaphors to evoke interest in the reader. Although necessitating events must be linked by causal relationships in a temporal sequence, the writer of the narrative does not need to reveal events in chronological order. The necessary components of a narrative include purpose, events, structure, time, agency, narrator, and reader (Reuer, 2012; Avraamidou & Osborne, 2008; Nathanson, 2006; Norris et al., 2005).

The narrative genre differs from the expository genre in many ways. An expository text presents information in topical form using concise and precise language to elicit a single interpretation of the content (Wolfe & Mienko, 2007). Conversely, a hallmark feature of a narrative is that it invites reader interpretation (Norris et al., 2005). There is also a common misconception that the narrative form cannot withstand the intellectual rigor and review that is commonly applied to expository texts; however, some researchers have shown otherwise. Howard (1991), as cited by Reuer (2012), suggests that the body of knowledge that constitutes science is a collection of stories and the process of science is a process of story refinement. For example, the 'story' of the atom has numerous authors-Dalton, Thompson, Rutherford, Bohr and Schrodinger have all contributed to the currently accepted story of atomic structure. It is suggested that the separation of logic and narrative is misguided; logic and narrative are two sides of the same coin as logic can be classified as a type of story (Bruner, 1991).

Narratives can also be described as a method. As such, a narrative can be used to describe the interaction between author and reader (Norris et al., 2005). A narrative can also be an interaction between numerous readers. When narrative is described as an activity, it is often called narrative discourse. Narrative can play a large role in the creation of our self-perception. Our personal narrative may describe how we see ourselves or our perception of the world around us (Kozoll & Osborne, 2004). Narrative-as-a-method is of special concern to teachers as this strategy can be used to influence student engagement and the integration of science into students' personal experience (Reuer, 2012).

The results of this study will add to the existing literature regarding the effects of narratives on science learning, especially in junior high school chemistry in the local setting. Studying how teacher-made narratives impact learning provides empirical evidence to help teachers and school heads come up with decisions that will help contribute to a more successful classroom. It will also promotes the international cry that every learner must be a reader and that every teacher must be a reading teacher.

Identifying how the type of the selection used in science learning, especially in chemistry, affect the achievement, retention and interest levels of the students will greatly contribute to the enhancement of the teaching and learning of science. It can be useful among science teachers as it can be used as an anchor to come up with contextualized narratives to be used as tools in teaching science. It may also further encourage them to exert more efforts to plan, contextualize and implement lessons and activities that will enhance the science proficiency of the students. On the part of the learners, this study will help them become more aware of their learning skills through reading. Awareness of their text preferences and how it affects their achievement, retention and interest levels can become an encouragement for them to exert greater effort in reading and in learning Chemistry. Students with increased interest towards Chemistry and the other sciences may have a higher predisposition to pursue the hard sciences later on.

Further, the results of this study can help administrators and curriculum planners in enhancing Chemistry education as it will provide them with empirical evidence that will help them make decisions which may impact the classroom and the system of education, in general, especially in terms of the text used inside the classroom and how reading is viewed in learning Chemistry. It will also give clear reasons on the need for faculty development programs not only in teaching chemistry but also on the development of reading and writing skills of the science teachers and how they would cultivate these in their own respective learning areas and learners.

In general, the objective of this study was to investigate how science narratives in junior high school chemistry influence the academic performance of Grade 9 learners. Specifically, it intended to determine the effect of teacher-made narrative fiction on levels of achievement, retention, and interest of the learners in Grade 9 Chemistry with focus on the covalent bonding. It also meant to determine the perception of the students toward the effect of science narrative fiction on their levels of achievement, retention, and interest on the topic of covalent bonding and on Chemistry.

Methodology

This is a quasi-experimental study that utilized a control group design together with the pre-test/post-test design. According to Kumar (2011), the pre-test/post-test design can measure change in a situation, phenomenon, issue, problem or attitude. It is the most appropriate design for measuring the impact or effectiveness of a program. Meanwhile, using a control group quantifies the impact of the extraneous variables and helps ascertain the impact of the intervention only. This design is chosen because the main objective of the study was to determine the effect of science narrative fiction on the achievement, retention, and interest levels of learners in Grade 9 Chemistry, specifically on covalent bonding, and not to compare it with other types of text or teaching strategies.

The respondents in the study are the Grade 9 students of a national high school in Benguet, Philippines who signified their willingness to participate. Of the total population, 173 students were selected via random stratified sampling in

combination with proportional sampling. Of this number, 87 participants were assigned under the experimental group while 86 participants were assigned under the control group. Males and females were also equally represented with the experimental group having 43 males and 44 females and the control group having 43 males and 43 females.

The materials used in the study (i.e., expository text, narrative fiction, tests, and checklists) were prepared and were validated accordingly. The teacher-made narrative fiction (TMNF) was first presented to a group of students to get a feedback on the development of the story. The TMNF was edited based on the students' feedback before it was subjected to validation by chemistry and science teachers for validity of content and for alignment with the prescribed learning competency and curriculum standard for Grade 9 Chemistry. In addition, English language teachers were asked to validate the text for the accuracy of its language, grammar, and spelling and they were also asked to validate the text if it contains the necessary elements for a narrative. Suggestions were then incorporated to come up with the revised version of the TMNF. This was then subjected to a readability test using the Flesch Reading Ease Formula and the Automated Readability Index. Finally, adjustments were made to produce the final version of the TMNF. (See Annex A)

Data collection included pre-, post-, and retention tests to determine the achievement level of the students and the retention level on covalent bond. The tests consist of of 17 multiple choice questions worth one point each and of varying degrees of difficulties that cover concepts on covalent bonding. The set of questions were validated and its reliability was established using the Kuder-Richardson Formula 20. The questions in the pre-, post, and retention tests were similar although they were rearranged randomly for each set. The highest possible score that a student can obtain in the test is 17 points.

A checklist with a 4-point Likert scale was used to gauge the interest levels of the students. The same scale checklist was used to gather information on the perceptions of the learners on how narrative fiction affects achievement, retention, and interest.

A pre-test was conducted as baseline for comparison. Their initial interest level was also measured through a checklist included in the pre-test. This was followed by the exposure of the students to their respective treatments. The first group served as the control group and was exposed only to the expository text. On the other hand, the second group served as the experimental group and was exposed to the expository text plus the TMNF. The students were presented with the lesson objective and were instructed to study the material given to them. No other interventions were given to both groups. After 30 minutes, a post-test followed to check on the achievement level of the students. A checklist was also included in the post-test to gather data involving students' interest after their exposure to their respective treatments. After the post-test, the students were surveyed, through the use of the checklist, on their perceptions on how narrative fiction affects achievement, retention, and interest levels. A week after exposure to the treatments, the experimental group and the control group took a similar follow-up assessment in the form of a retention test to check on their levels of retention. So as not to affect the outcomes of the study, the students were informed that there is still a last part of the study that they will still have to participate with within the next few days. However, the students were not informed of the date of the retention test until the day itself.

Various data treatments were applied to meet the objectives of the study. For the data gathered involving achievement and retention, *t*-test at 5% level of significance was used. The level of achievement was primarily based on the gain scores of the students arising from their pre- and post-test scores. The corresponding rating and description for the mean scores were adapted from Department of Education (DepEd) Order no. 8, s. 2015 which is DepEd's current guideline on student assessments. The rating was obtained by dividing the mean score with the highest possible score then multiplying its result by 100. The obtained value was then transmuted using the transmutation table in the aforementioned DepEd order (Table 1).

The level of retention was based on the difference of the post and retention tests scores of the respondents. In order to describe the level of retention, the percent difference of

the scores was first computed by subtracting the retention test score from the post-test score then dividing the difference by the latter. The resulting value was then multiplied to 100. The computed percent difference corresponds to the percent of what was forgotten. To determine the retention, the percent of what was forgotten was subtracted from 100, which corresponds to a perfect retention. A range and description table was prepared to interpret the retention level (Table 2) based on the results on the forgetting curve proposed by Kohn (2014) and Terada (2017) where an average of 90% is forgotten within the span of one week. Also in Table 2, a checklist with 4-point Likert scale was used to gauge the interest level of the respondents. Similarly, a checklist with 4-point Likert scale was also used to gather data on the perceptions of students on how narratives affected their level of achievement, retention, and interest.

Table 1

The Transmutation Table Used in the Study

Mean Score Scale	**Grading Scale**	**Descriptors**
14.28 - 17.00	90-100	Outstanding
12.92 - 14.27	85-89	Very Satisfactory
11.56 - 12.91	80-84	Satisfactory
10.20 - 11.55	75-79	Fairly Satisfactory
0.00 - 10.19	Below 75	Did Not Meet Expectations

(Adapted from Department of Education (DepEd) Order no. 8, s. 2015)

Table 2

The Criteria for Rating Retention, Interest and Effect of Narrative as Used in the Study

Retention		**Interest**			**Effects of Narrative**		
Range	Description	Rating	Range	Description	Rating	Range	Description
80.01% - 100.00%	Superior Retention	4	3.26 – 4.00	Highly Interesting	4	3.26 – 4.00	Strongly Agree
60.01% - 80.00%	Very High Retention	3	2.51 – 3.25	Interesting	3	2.51 – 3.25	Agree
40.01% - 60.00%	High Retention	2	1.76 – 2.50	Somewhat Interesting	2	1.76 – 2.50	Disagree
20.01% - 40.00%	Above Average Retention	1	1.00 – 1.75	Not Interesting	1	1.00 – 1.75	Strongly Disagree
0.00% - 20.00%	Average Retention						

Results and Discussion

Effect of Teacher-Made Narrative Fiction on the Students' Level of Achievement

Table 3 shows that the exposure of the students to the teacher-made narrative fiction (TMNF) has a positive effect on their achievement level. Though the description of the ratings during the pre-test and post test are the same, statistical analysis of the students' scores for the pre- and post test shows a significant difference (p= 0.00). This indicates an increase in the learning of the students after exposure to TMNF.

This result matches with Reuer's (2012) data that showed a positive correlation for examination questions addressed by narratives and with Aktas and Yurt's (2017) study which showed that digital storytelling has a positive effect on student achievement. According to Marsh (2003), as cited by Csikar and Stefaniak (2018), while the use of stories in education has often been limited to supplemental instruction, it has been shown that individuals are able to learn new facts from stories without prior exposure with a similar degree of success as learning through traditional lecture. Using stories as a vehicle to deliver content with a high intrinsic load may help in learning, comprehension, and ultimately, in the development of new schema by building on existing ones. In addition, other researchers also assert that using narratives in educational practice enhances learning because our brains are hard-wired to interpret narratives. Accordingly, narrative comprehension may be one of the most primal cognitive thought processes (Csikar & Stefaniak, 2018; Bruner, 1991).

However, despite the increase in the score and the rating of the respondents, the post test rating remains under the description 'Did Not Meet Expectations' (DNME). It must be noted that aside from the exposure to the expository text and the teacher-made narrative, no other interventions were made. Thus, it can be speculated that in order to further raise the achievement level of the learners, additional teaching strategies must be employed. The selection of an appropriate teaching approach is one of the most important processes to have teaching success and better student achievement. Further, students learn with different styles, at different speeds, different levels of prior knowledge and different environments. Thus, teachers must use appropriate methodologies, approaches, and strategies capped with compassionate and winsome nature to teach effectively (Dyer & Osborne, 1995; Shinn, 1997; Iringan et al., 2008).

Effect of Teacher-Made Narrative Fiction on the Level of Retention of Students

Table 3 also shows that there is a significant decrease in the mean score of the respondents when they were given a follow-up test (retention test) one week after their exposure to the treatment. The decrease in the scores of the students may mean that they forgot some of the concepts that were presented in their prior treatment. However, the mean score of the respondents during the retention test is higher than their mean score during the pre-test (mean = 6.53) which means that the students are able to retain some of their prior learning.

The decrease in the mean score of the respondents corresponds to a retention of 88.50% which is qualitatively described as superior retention since it is greater than

Table 3

Level of Achievement and Retention of Students Exposed to Narrative Fiction

Level of Achievement			**Level of Retention**		
Tests	Mean	Rating	Tests	Mean	SD
Pre-Test	6.53*	69	Post Test	9.30*	2.77
Post Test	9.30*	73	Retention Test	8.23 *	2.45
			Percentage Retention	88.50%	Description: Superior Retention

*Note: *Significant*

the reported average retention of 10% in a week (Kohn, 2014). This decrease in the performance of the students as seen in the results of their retention test is also documented by other studies. In the study of Aktas and Yurt (2017) on the effects of digital story on academic achievement, learning motivation, and retention among university students, the respondents also performed lower in the follow-up test 30 days later as compared to the initial post-test. Also, Negrete (2002) observed that the respondents exposed to narratives had a gradual drop, although not significant, in performance a week after their initial post test.

The lower mean score during the retention test may be explained further by Ebbinghaus' forgetting curve, a measure of how much is forgotten over time. Wherein, it was discovered that without any reinforcement or connections to prior knowledge, information is quickly forgotten—roughly 56% in one hour, 66% after a day, 75% after six days (Terada, 2017) and an average of 90% in one week (Kohn, 2014).

Effect of Teacher-Made Narrative Fiction on the Students' Level of Interest

The result shows that the level of interest of the learners toward the topic used in the study (covalent bonding) and toward Chemistry was increased (Table 4). The respondents found the topic on covalent bonds as "Somewhat Interesting" prior to their exposure to the treatment. After their exposure, the level of interest changed into "Interesting." On the other hand, the students find chemistry, as interesting both before and after their exposure to the treatment. It must be noted that although the qualitative description for both events are the same, the numerical values are significantly different. These findings show that students who were exposed to the teacher-made narrative have an increased level of interest towards covalent bond and towards Chemistry.

These results resonate with the observation of Reuer (2012), based on her study on the use of narratives in high school biology, that narratives had a positive effect on students overall interest in the course. They also agree with the statement made by Csikar and Stefaniak (2018) that the use of stories can make an otherwise unpalatable lesson, into a more meaningful, and interesting one. The change in the interest level of the respondents may be attributed to the "privileged status" of the story which means that the human mind treats narrative differently from other types of discourse. Narrative comprehension is one of the first cognitive processes to be develop mentally in children and that the human brain is hard-wired to interpret narratives (Willingham, 2004; Nathanson, 2006; Bruner, 1991). Moreover, narratives provide a discourse between the author and the reader and that if individuals engage in a meaningful discourse about a narrative, they may make judgements that contribute to their world view. This can also emphasize the relevance of science in their everyday lives (Metz, 2004; Oostheok, 2007). Claus and Kelter (2006) assert that the use of narratives allow students to make interpretations and to use their imagination which encourages a sense of authorship of their learning; this assertion is supported by the results of this study. When the higher faculties of interpretation and imagination are activated in students, it will likely lead to a greater student engagement in science.

In addition, the students may feel more interested toward the subject matter and towards chemistry, in general, with the use of narratives since these require emotional investment, concrete visualization, and are open to cultural bias (Reuer, 2012). Instead of being passive recipients of science, students can feel as though they are navigating the content (Donnelly, 2004). Thus, narratives serve as a tool to humanize and contextualize science with a secondary effect of making science more enjoyable to learners (Claus & Kelter, 2006).

Comparison of the Level of Achievement of Students

Table 5 presents the level of achievement of the students in the experimental and control groups. From this, it can be seen that there are observable changes in the post-test scores of both groups when compared to their respective pre-test scores. However, it can also be seen that the qualitative ratings of both groups prior and after the treatment remained to be 'did not meet expectations' (DNME).

Although the qualitative descriptions for the results of the pre-test and post-test for both

Table 4

Level of Interest of the Students

Area	Exposure	Mean	Description	t-Value	p-Value	Remarks
Topic (Covalent Bonding)	Before	2.47	Somewhat Interesting	-6.90	0.0000	Significant
	After	3.17	Interesting			
Chemistry	Before	2.51	Interesting	-8.39	0.0000	Significant
	After	3.13	Interesting			

Table 5

Difference in Achievement Gain Scores

Group	**Achievement Scores**					**Retention Scores**				
	Pre-Test		Post Test		Gain	Post Test	Retention Test	% Retention	Description	Mean Gain Score
Expository with TMNF	6.53	DNME	9.30	DNME	2.77*	9.30	8.23	88.50%	Very High	-1.07*
Expository Text Only	6.13	DNME	7.44	DNME	1.31*	7.44	5.57	74.84%	Superior	-1.87 *

groups are the same, it can be seen that the mean gain score of the experimental group (2.77) is significantly higher (p = 0.0006) than the mean gain score (1.31) of the control group. This shows that there is a significant difference between the achievement levels of students exposed to expository text with TMNF from those exposed to expository text only. Although both treatments effected a change in the mean scores of the students, the higher change in the gain score of the experimental group indicates higher achievement level. Thus, the use of the TMNF led to an increase in the achievement level of the students.

These results support the findings of Akarsu et al. (2015) where they found that using scientific stories created a significant difference on the academic achievement of the learners exposed to the method. The result is also consistent with the findings of several studies (Coskun et al., 2012; Yesilyurt, 2004 as cited by Akarsu et al., 2015; Reuer, 2012; Aktas & Yurt, 2017; Csikar & Stefaniak, 2018) that show positive result on student achievement with the use of narratives.

This observation may be explained by Graesser's (1981) assertion, as cited by Norris et al. (2005), that narrative passages are read faster, comprehended better, and tend to be more absorbing than expository passages. The same study further stated that an explanation sometimes offered for such findings is that the actions and events in narrative are interpreted by readers as more concrete and more easily and closely organized by causal relationships than the organizational structures found in expository and argumentative prose.

Comparison of the Level of Retention of the Students

Table 5 also presents the difference in the level of retention of the experimental group (expository text with TMNF) and the control group (expository text only). Both groups recorded a decrease in their mean scores when the result of the retention test is compared to the result of the post-test. However, the retention test mean score of the experimental group (88.50%) is still slightly higher than the mean score recorded by the control group (74.84%).

Both groups performed lower in the retention

test as compared to their post-tests. Further analysis of their gain scores using *t*-test (p=0.0323) indicated a significant difference. The experimental group fared better than their counterpart in terms of retention or in remembering concepts on covalent bonding. This result indicates a significant difference between the retention levels of students exposed to expository text with TMNF from those exposed only to expository text.

It could be speculated that the lower retention test score is due to retrieval failure and/or failure of the learners to store in the long term memory coupled with information interference that they may have experienced in between the post-test and the retention test. It may be further speculated that the TMNF helped store the concept of the lesson in the long term memory of the students as audiences are more likely to engage with and adopt messages that triggers an emotional response. It has been previously pointed out that narratives may have a lasting effect on memory and learning as narratives require emotional investment. Added to this, it has thematic and temporal syntax. It also employs concrete visualization, encourages imagination and interpretation, and it is also open to cultural bias (Reuer, 2012).

The result of the study is consistent with other researches on the effect of narratives on retention. Graesser (1981) and Graesser et al. (1980), as cited by Norris (2005), have also found that narrative passages positively affect memory. In like manner, Young and Anderson's (2010) found that the use of personal narrative in classroom case study analysis improved long term retention among allied health students. Also, Reuer's (2012) research on the use of narratives in high school biology showed that narratives had a significant effect on student retention of content, especially among average and low achieving students.

However, some researchers also suggest otherwise. Negrete and Lartigue (2010) found that factual retention was higher for expository text than narrative text when recall was tested after one week from time of exposure; yet, after two weeks the recall was slightly better for narratives than expository texts. This made them conclude that narratives fare better in retention in the long run. In addition, Wolfe and Mienko (2007) found that there was no difference between expository or narrative text for learning, as evidenced by memory recall; however, they did find that the amount of prerequisite knowledge required for optimal learning was higher for expository text than narrative text. This support the idea that narratives are easier to comprehend.

Comparison of the Level of Interest of Students

Table 6 shows that there is a change in the interest levels of the students after their exposure to their respective treatments. The students in the control group consistently viewed the topic on covalent bonding as 'Somewhat Interesting' while they viewed Chemistry, as 'Interesting.' Meanwhile, students in the experimental group changed their level of interest toward the topic on covalent bond from 'Somewhat Interesting' to 'Interesting' while their description for their interest level toward Chemistry remained 'Interesting' after their exposure to TMNF.

The gain score of the control group was negative for the interest level towards the topic on covalent bond while it was positive for the interest level toward Chemistry. In contrast, the gain score of experimental group is positive for both areas. The positive gain score reveals that there is an increase in the interest level of students exposed to TMNF both towards the topic (covalent bond) and towards the subject (Chemistry). On the other hand, the gain scores on interest level of the control groups reveal that the students exposed to the expository text alone did not experience a considerable change in their interest levels. Furthermore, comparing the gain scores of the experimental group and the control group toward the topic (covalent bond) and toward the subject (chemistry) revealed significant differences. These findings show that there is a positive change in the interest levels of the learners exposed to the TMNF while those exposed only to the expository text did not experience any significant changes in their interest levels. This shows that narratives can lead to an increase in the interest level of the students not only toward the topic at hand, but also toward Chemistry.

The result presented here supports the observation that narratives have a positive effect on student's interest as shown in other researches (Csikar & Stefaniak, 2018; Prins et

Table 6

Difference in Interest Gain Scores

Area	Group	Mean Scores				Gain	t-value	p-value	Remarks
		Pre-Test		Post Test					
		Mean	Description	Mean	Description				
Topic (Covalent Bonding)	Expository with Narative Fiction	2.47	Somewhat Interesting	3.17	Interesting	0.70	7.7946	0.0000	Significant
	Expository Text Only	2.47	Somewhat Interesting	2.42	Somewhat Interesting	-0.05			
Chemistry	Expository with Narative Fiction	2.51	Interesting	3.13	Interesting	0.62	5.8754	0.0000	Significant
	Expository Text Only	2.58	Interesting	2.59	Interesting	0.01			

al., 2017; Reuer, 2012). A possible explanation of why narratives lead to a higher interest could be that narratives are delivery mechanisms that can communicate factual information in a more comprehensible way than expository texts do. Most narratives have a clear picture while the organizational structure of expository texts is not always evident to readers. Narratives have the ability to hook audiences, where the students' natural curiosity is stimulated; it activates the pleasure principle, where the students can follow the course without being bored; and, it facilitates retention (Metz, 2007; Claus & Kelter, 2006; Nathanson, 2006; Norris et al., 2005).

Perceptions of the Experimental Group on How Narrative Fiction Affects Achievement, Retention, and Interest Levels

Overall, Table 7 shows that the mean rating of the perceptions of the experimental group is significantly higher than the hypothesized value; although both values are still within the same range (agree). This shows that the respondents perceive a greater positive effect as compared to what was hypothesized. Nevertheless, the findings confirm that the students exposed to expository text with TMNF perceive that narrative fiction positively affected their levels of achievement, retention, and interest.

More specifically, the experimental group perceived narrative stories as helpful in improving their academic achievement in the lesson about covalent bonds and in Chemistry. Moreover, the students agreed with the statement that reading narrative stories will help them remember the topic presented as well as other lessons in Chemistry. Also, the students agreed that narrative stories make them more interested with the topic at hand and with Chemistry. Statistically, there is no significant difference between the hypothesized and experimental mean ratings of the students which indicate a positive perception among the respondents toward how narrative fiction affect their achievement, retention, and interest levels.

What is striking is the response of the experimental group on the last statement where they strongly recommended that narratives be included in other Chemistry lessons. This response is significantly different from what was hypothesized. However, the significant difference is taken in positively as the response "strongly agree" supports the idea that narratives have a positive effect on the levels of achievement, retention, and interest. It can be speculated that this high agreement with the statement may be an effect of their first hand experience with the material (TMNF).

The result presented here also echoes the findings of Reuer (2012) where the students believed that the narratives were effective at enhancing their learning. Akarsu et al. (2015) also found that most of the student-respondents in their study recorded a positive response towards the use of narratives. In the study of Waugh and Donaldson (2016) which focused on nursing students' perceptions of digital narratives of compassionate care, the students suggested such stories would also be useful for preparing them for practice placements and training of mentors. Perhaps, students have a positive perception towards narratives because it emphasizes a story and a personal identification with a character while expository prose uses facts, logic, and rhetorical structure to persuade or inform (Nathanson, 2006).

Table 7

Perceptions of the Experimental Group on How Narrative Fiction affects Achievement, Retention, and Interest Levels

Statements	Hypothesized		Experimental		t-value	p-value	Remarks
	Mean	QI	Mean	QI			
Reading narrative stories will help improve my academic achievement in Chemistry, in general.	3.00	Agree	3.14	Agree	1.9267	0.0573	Not Significant
Reading narrative stories about covalent bonding will help improve my academic achievement in the lesson about covalent bonds.	3.00	Agree	3.08	Agree	1.2615	0.2105	Not Significant
Reading narrative stories will help me remember my chemistry lessons, in general.	3.00	Agree	3.13	Agree	1.7377	0.0858	Not Significant
Reading narrative stories about covalent bonding will help me remember the lesson about covalent bonds.	3.00	Agree	3.08	Agree	1.0945	0.2768	Not Significant
Reading narrative stories will make me more interested in the lesson about Chemistry, in general.	3.00	Agree	3.11	Agree	1.3943	0.1668	Not Significant
Reading narrative stories about covalent bonding will make me more interested in the lesson about covalent bonds.	3.00	Agree	3.01	Agree	0.1553	0.8770	Not Significant
I recommend that narrative stories be included in Chemistry lessons.	3.00	Agree	3.26	Strongly Agree	3.1447	0.0022	Significant
Over-all	3.00	Agree	3.12	Agree	3.9794	0.0072	Significant

Comparison of the Perceptions of the Experimental and Control Groups on the Effects of Narratives on Achievement, Retention, and Interest Levels

The results in Table 8 show that the students exposed to TMNF positively responded with regard the statements on the levels of achievement, retention, and interest. Moreover, it also clearly shows that the control group perceived effect of narrative stories in their achievement, retention, and interest levels, too.

The control group agreed with the statements that reading narrative stories will help them improve their academic achievement on the topic at hand (covalent bond) and on Chemistry. They further agreed that reading narrative fiction can also help improve their retention levels on the topic at hand and it can also help them remember their chemistry lessons. Although the respondents were not exposed to a narrative story, the control group agreed that narrative stories should be included in Chemistry lessons.

Table 8

Comparison of the Perceptions of the Experimental Group and the Control Group

Statements	Experimental		Control		t-value	p-value	Remarks
	Mean	QI	Mean	QI			
Reading narrative stories will help improve my academic achievement in Chemistry, in general.	3.14	Agree	2.8	Agree	3.5530	0.0005	Significant
Reading narrative stories about covalent bonding will help improve my academic achievement in the lesson about covalent bonds.	3.08	Agree	2.78	Agree	3.2593	0.0013	Significant
Reading narrative stories will help me remember my chemistry lessons, in general.	3.13	Agree	2.76	Agree	3.5309	0.0005	Significant
Reading narrative stories about covalent bonding will help me remember the lesson about covalent bonds.	3.08	Agree	2.83	Agree	2.3799	0.0184	Significant
Reading narrative stories will make me more interested in the lesson about Chemistry, in general.	3.11	Agree	2.69	Agree	3.9459	0.0001	Significant
Reading narrative stories about covalent bonding will make me more interested in the lesson about covalent bonds.	3.01	Agree	2.66	Agree	3.1229	0.0021	Significant
I recommend that narrative stories be included in Chemistry lessons.	3.26	Strongly Agree	2.74	Agree	4.4448	0.0000	Significant
Over-all	3.12	Agree	2.75	Agree	9.9194	0.0000	Significant

Further comparison shows that both the experimental and control group agree on the first six statements with regard how they perceive the effects of narratives toward their achievement, retention, and interest levels. However, it is note-worthy that the experimental group's mean rating for each of the first six statements is significantly higher than the control group's mean rating.

A comparison on the response of the experimental and control group in the last statement, "I recommend that narrative stories be included in Chemistry lessons" where the experimental group strongly agreed with it while the control group only agreed with the statement showed a statistical significance at 5% level of significance. Despite the difference in their responses, both groups consider the inclusion of narratives in their chemistry lessons.

Additionally, the overall perception rating showed that there is a significant difference in the perception of the experimental group and the control group. The perceptions of the students support the findings presented earlier where the experimental group showed a higher level of achievement, retention, and interest toward covalent bond and toward Chemistry, as compared to the control group. The higher value in the experimental group's perception rating can, perhaps, be attributed to their exposure to the actual material.

This positive perception among the learners toward narratives may not be surprising since primary literacy education focuses almost exclusively on this literary form and it asserted that narrative comprehension may be one of the most primal cognitive thought (Norris et al., 2005; Bruner, 1991). How the human mind treats narratives is a considerable factor since the human mind treats narrative differently from other types of discourse. It has the following advantages: (a) everyone loves a good story; (b) stories are easier to comprehend thus read more quickly than non-narratives; (c) the structure of narratives provides a more familiar organizational pattern for ideas which is more accessible than expository texts; and (d) active reading involves "on-line" processing and makes inferences and narrative texts evoke interesting ambiguities which translate to more effective memory-making (Willingham, 2004; Nathanson, 2006).

Conclusions

The results of the study showed that exposure to teacher-made narrative fiction can increase the levels of achievement, retention, and interest of students on some topics of Chemistry, specifically in covalent bonding. It can also be concluded that exposure to narrative fiction can further increase the positive perception of students towards this type of instructional reading material. Lastly, students, whether exposed or not exposed to narrative fiction, perceive that narratives can positively affect their levels of achievement, retention, and interest in learning the topic about covalent bonding and in other areas of Grade 9 Chemistry.

Recommendations

In view of the aforementioned findings and conclusions, the following recommendations are offered. The use of teacher-made narrative fiction as a teaching-learning tool or method in teaching covalent bonding, and in teaching Chemistry, may be adapted in the classroom in addition to the traditional expository texts and materials to help increase the students' levels of achievement, retention, and interest toward Chemistry. Moreover, narratives may be used in conjunction with expository text together with additional teaching-learning strategies that address the individual needs of the learners coupled with the teachers' positive, compassionate and winsome nature to further increase the students' achievement level.

It is also recommended that the positive perception of the students toward narratives be taken advantage of by exposing students to various reading materials that are not only academic but are also enjoyable such as the various forms of narratives. This will help further develop the love of reading among students to allow them to enjoy and learn simultaneously from reading expository and narrative texts, especially those that are Chemistry-related. In relation to this, it is further recommended that narrative fiction stories for other Grade 9 Chemistry topics be developed and validated which may also lead to the development of a

repertoire of tested narrative fiction stories for Chemistry which can be accessed by teachers and learners within the community. Thus, it might be necessary to train science teachers and their capacities be built in the field of literature and narrative writing to help them come up with creative narratives that they can use of in their own classrooms. To this effect, administrators and school heads may provide an avenue for the teachers to develop their skills in reading and writing through seminars, trainings, and other appropriate faculty development programs. On the other hand, curriculum planners, including book writers and publishers may also consider the addition of narratives in the planning of the basic science curriculum and in the publication of basic education science books. Finally, further research may be conducted to validate the results of this study, especially in the other discipline of science and in the other grade levels.

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Appendix A – An Excerpt from the TMNF Used in the Study

A Covalent Daydream

(An Excerpt)

Their eyes met, and for a moment, Angelie felt her heart skip a beat.

She wished she had the courage to admit that she likes Alex. She felt weak, like a covalent bond. She wished she was stronger, like an ionic bond.

"Hey, let's move up there so we can see the other hydrogen atom bonded to this oxygen atom." Alex's voice interrupted Angelie's daydream of romance.

"Yeah… right… water is H_2O, it ought to have two hydrogen atoms." Her blushing face turned redder as she quickly looked away.

"Oh, why must water have two hydrogen atoms?" she absent-mindedly mumbled while thinking about her interrupted moment with Alex.

Alex having heard her answered, "To obey the octet rule, silly."

"Huh?" she looked at Alex.

"Oxygen needs two hydrogen atoms because it only has six valence electrons. Oxygen shares an electron to a hydrogen atom which completes the duet of the first hydrogen. The shared hydrogen electron now makes the valence of the oxygen atom seven. Because it needs one more to complete the octet, oxygen shares again an electron with a second hydrogen atom. This repeats the process completing the duet of the second hydrogen, and finally, the octet of the oxygen," Alex went on.

What Alex said seemed so difficult to process but his angelic voice made it an understandable music to Angelie's ear.

"Right, elements will share electrons just to be stable." It was Angelie. "Aren't they like humans somehow?"

"What makes you say that?" Alex looked at her.

"They're willing to share, just to be stable. Like us humans, we are willing to give love to have love in return and feel complete," she explained as she looked back at him.

"Hmmm… I think, we, as human beings, should go beyond that… we should share without expecting something in return," Alex replied quite melancholically.

"What do you mean?" she asked in awe.

"Well, we classify covalent bonds as single bonds, double bonds, or triple bonds. See the hydrogen and oxygen atoms in the water molecule, they're single bonded. They share only one electron with each other. Though some atoms can have two shared pairs of electrons with another atom to make a double bond, the maximum number of shared electron pairs is three from each atom which creates a triple bond."

"No four pairs?" Angelie teased.

"None," Alex laughed.

Silence followed.

"I guess, I agree with you," Angelie broke the silence speaking more seriously.

"In covalent bonding, if an atom shares an electron, both atoms benefit," she paused then sighed deeply. She then looked away and said, "There's a limit… and a match. Not so much with humans though, you can share so much but get so little in return."

Alex looked at her quietly and moved closer.

"You're right, we humans should share without expectations," she finished with an even deeper sigh.

"That's deep." Alex sighed as he slowly took Angelie's left hand with his right.

No one spoke for a long time as they soaked in the magnificence of the view of the molecule beneath them.