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The effect of cold-calling on voluntary participation in a middle school science classroom

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Effect of Cold-Calling on Voluntary Participation in a Middle School Science Classroom

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Abstract

This action research study investigated the effect of cold-calling on voluntary participation in a middle school science classroom. Four sections of an eighth grade science class were observed: two of the sections were with a teacher who used cold-calling often, and two of the sections were with a teacher who does not use cold-calling. An observer recorded the number of students who volunteered to answer a question after it was first asked. Although the students in the class with the teacher who used cold-calling frequently had higher rates of voluntary participation, the results were not statistically significant; therefore, there is not enough evidence in this research to confidently claim that cold-calling increases voluntary participation in middle school science classrooms.

Effect of Cold-Calling on Voluntary Participation in a Middle School Science Classroom

A very common desire of teachers in secondary classrooms is to increase engagement during class discussions. Although engagement can be measured in a variety of ways, participation in class discussions is perhaps the easiest response to quantify. Voluntary participation, such as raising a hand to answer a question, can be a very valuable tool for a teacher to gauge students' current level of content understanding and make instructional decisions based on that informal data. Unfortunately, the problem with large-group class discussions is that they often are dominated by the voices of a few (Czekanski & Wolf, 2013). By increasing the number of students who share answers during class discussions, the teacher will have a better idea of how well a majority of the students are understanding the content.

One method teachers use to increase participation is cold-calling. Cold-calling is an instructional strategy in which the teacher calls on a student to answer a question in front of peers when their hand is not raised (Dallimore et al., 2019). Although literature has shown cold-calling to increase voluntary class participation at the collegiate level (Dallimore et al., 2012), there is little evidence demonstrating its effectiveness at the middle school or secondary level. The purpose of this action research is to determine if cold-calling on students in a middle school science classroom will lead to increased voluntary participation during class discussions.

Scholarly articles that met the criteria for inclusion in the literature review were published within the last ten years and were limited to research that focused on active learning in the classroom. The articles examined what impact cold-calling has on voluntary participation, time spent preparing for class, and learning outcomes. Additional articles examined the roles of gender and anxiety on voluntary participation. Finally, articles that examined best practices for increasing voluntary participation were included in this review.

Current research shows that when cold-calling is used frequently, randomly, and non-punitively in classrooms, it can increase students' confidence in risk taking, making them more likely to volunteer contributions to class discussions. Before students will feel safe sharing responses in front of peers, it is important to build a classroom culture that rewards risk taking and does not shame mistakes.

This literature review is organized into three sections. The first section defines cold-calling and provides examples of how it is used in a variety of educational settings. The second section focuses on the role of gender, both of student and faculty, and how it affects classroom discussions. The third section describes best practice strategies to use when incorporating cold-calling in order to reduce student anxiety and negative perceptions associated with cold-calling. Finally, the last section discusses best practices in the classroom for increasing voluntary participation.

Literature Review

Increasing engagement and participation in class discussions is a challenge faced by many educations today. According to Dallimore et al. (2019), "classroom discussion is widely used and highly valued for actively engaging students in their own learning" (p. 14). Participation in class discussions can lead to increased engagement with course materials, increases recall, and enriches the learning environment (Sereno et al., 2020). Due to a plethora of reasons including, but not limited to gender (Eddy et al., 2014, Moffett et al., 2014, Opie et al., 2018) cultural norms (Dallimore et al., 2019), lack of preparation (Dallimore et al., 2019) and anxiety (Doty et al., 2020, Brigati et al., 2020), classroom discussions are often dominated by the voices of a few students (Wiest & Pop, 2018).

Cold-calling is an instructional strategy used to call on students to answer questions in front of peers when they have not volunteered (Dallimore, 2019). This strategy can assist in facilitating a student's ability to "process information quickly and to communicate a response effectively" (Levy, 2014, p. 93). While some students and instructors associate cold-calling with shaming an off-task student that is often not the case. "Cold calling is not a check whether students are on task, but to invite discussion for higher-order thinking." (Li and Pinto-Powell, 2017, p.2). According to Waugh and Andrews (2020), "there is no agreed-upon definition of cold-calling, but it is generally used to refer to the instructor calling on a student by name." When each student has an equal chance of being called on to participate, it leads to an increase the diversity of voices that are heard (Waugh & Andrews, 2020).

Research conducted by Dallimore et al. (2013) proved that when instructors frequently used cold-calling, voluntary oral participation increased throughout the duration of the semester in undergraduate accounting courses. Best practices for cold-calling include error framing (Doty et al., 2020) and a predictable randomness in who gets called on (Holland et al., 2011).

Class Participation

Cold-calling can increase students' confidence in classroom participation by forcing them to participate and therefore gain experience. Dallimore et al. (2013) conducted a qualitative study to examine the relationship between cold-calling and voluntary participation, as well as students' self-reported comfort levels in participating in large-group class discussions. Data was collected from 16 sections of an undergraduate business course averaging about 40 students per section. Pre-course surveys were issued to students regarding their attitudes and behavior surrounding class discussions. Students were observed twice during the courses and participation was tallied. A post-course survey was issued regarding comfort levels and participation frequency.

The results of this research "demonstrate that significantly more students answer questions in classes with high cold-calling and that the number of students voluntarily answering questions in high cold-calling classes increases over time" (Dallimore et al., 2012, p. 305). Additionally, the students who were enrolled in the sections with high frequency cold-calling also reported increased comfort participating in discussions, while students in the low frequency cold-calling sections did not report a change in comfort levels.

Dallimore et al. (2013)'s research demonstrated that cold-calling increases voluntary participation, but does it incentivize the students to prepare more for class? Levy (2014) investigated the effects of web postings and cold-calling independently and in combination on student outcomes. In order to examine this relationship, Levy (2014) conducted two experiments. For the first experiment, students in graduate level statistics courses were assigned to two different sections. One section was assigned a web-posting before each class and then cold-calling strategies were used by the instructor during class. The second group was simply encouraged to read, and then only voluntary responses were expected during class discussions. In the second experiment, which occurred with the same group of students later in the semester, students were either assigned a web-posting before each class or were in a section with high frequency cold-calling. After examining the results, Levy (2014) concluded that, when used together, web postings and cold-calling increased the amount of time students spent reading for class. However, this finding did not translate to increased learning. In the second experiment, there was no significant difference between the amount of time students spent reading before class based on whether they were assigned a web-posting or anticipated cold-calling. Based on the results of the two experiments, neither web postings nor cold-calling was shown to be

superior to the other, but when used together, they increased the average reading time per student prior to class.

Cold-calling can increase students' oral participation, and according to Levy (2014), increases student reading time before class, but does it actually lead to increased learning? Carstens et al. (2016) conducted a quantitative study to determine whether participation credit or cold-calling would have a greater impact on exam scores. A sample of 156 undergraduate students in six sections of an introductory psychology course were selected to participate. Baseline data of voluntary participation was collected by having students record their comments on a notecard. During the first unit of the course, only voluntary participation was used without any incentive of participation credit. After the first unit was complete, students whose participation rates were in the top or bottom quartiles were selected for inclusion in the analysis. Sections were then selected to either earn participation credit or have the instructor use cold-calling. For the group of students in the participation credit section, the instructor would pose a question, call on students who had their hands raised, rephrase the question once if necessary or wait 15 seconds, then move on to the next question. In the cold-calling section, the instructor had a list of student names in random order that they would use to call on students. By the end of the course, the exam scores did not show a significant difference between the groups with participation credit or cold-calling. Students who were in the top quartile for voluntary participation scored higher on average than the students in the lowest voluntary participation quartile.

Carstens et al. (2016) examined the relationship between participation and grade, but what role did prior knowledge play in that participation? Karner and Warwas (2015), conducted a longitudinal, multi-method design study to examine the impact of students' prior knowledge

and uncertainty on teacher interactions. A pretest was given to determine a student's level of background knowledge, videos were observed to document participation, and interactions and a post-course questionnaire was filled out by the students. Results of this study showed that the quantity of student participation, or the number of times the students orally participated in class, did not vary based on the student's background knowledge about a topic. The study did show that students with stronger background knowledge provided more robust responses with greater levels of affirmation from instructors and were more likely to be called on through cold-calling and asked follow-up questions than students with weaker background content knowledge.

Karner and Warwas' (2014) research showed that students who come to class with different levels of background knowledge volunteer at approximate same rates. So, what are strategies that can increase the overall volume of students who volunteer to answer questions in large-group settings? Sereno et al. (2019) conducted an experiment to test the effect of self-affirmation, commitment, both self-affirmation and commitment, and a control group on oral participation in a large-group undergraduate setting. A sample of 157 students were assigned to one of the four groups. The participants who received the self-affirmation treatment were instructed to a paragraph about they demonstrated characteristics such as kindness, honesty, success, and independence prior to attending class. The students who were assigned to the group that included commitment wrote a paragraph about why participation in class is important and were asked to provide examples of times they had participated in the past. The results showed that students who received the treatment for both self-affirmation and commitment had higher oral participation rates than any of the other three groups. The group with the second highest oral participation was the group that wrote about self-affirmation, followed by the control. The commitment treatment only group had the lowest oral participation.

While some students can be motivated intrinsic factors such as self-affirmation and commitment, other students are more motivated by extrinsic factors, like winning a competition. Cheathum et al (2017) conducted a quantitative study to determine the effects of competition on voluntary participation. These researchers conducted a quantitative study to examine the effect of the Good Behavior Game (GBG) on voluntary participation in introductory psychology classes at a public university. The Good Behavior Game creates a competition within the class by dividing the class into two sections then having them compete with each other to see who can answer the most questions correctly. For this study, three sections, averaging 116 students each, were observed and in order to collect baseline data. For each question posed by the instructor prior to the incentive from the Good Behavior Game, the number of hands raised per question ranged from 0.1 to 1.6. When implementing the Good Behavior Game, the room was divided into two sections at the beginning of each lecture, and students signed their names on a list recording which side they were on. Each time the instructor asked a question and a student answered correctly, a point was added to that side's total. Cheathum et al. (2017) alternated the Good Behavior Game competition with the same competition plus a reward. The reward was one point that counted toward final grades. Participation rose with the implementation of the Good Behavior Game with a reward, with the average number of hands raised per question ranging from 1.8 to 7.0. Average hands raised per question with competition only ranged from 0.9 to 6.9. The researchers concluded that implementing the Good Behavior Game increased participation significantly, but receiving a reward for participation did not necessary increase student participation.

The relationship between the student and instructor plays a role in the likelihood that a student will volunteer to participate in a classroom discussion. A qualitative study conducted by

Jebbour and Mauaid (2019) examined whether the use of self-disclosure by an instructor would increase voluntary participation. Six sections of undergraduate English language courses were observed, and data about student voluntary participation was recorded. The findings showed that when instructors engage in self-disclosure, such as sharing personal experiences and opinions, students were motivated to reciprocate the sharing of personal experiences and volunteer responses in front of peers. When students feel comfortable with an instructor, they are more willing to share ideas during class discussions.

There are many strategies that instructors can use to increase voluntary participation. In all of these examples, students felt more comfortable participating in the experimental setting than in the control. Teachers need to create environments where participation is normal and expected, and also where students feel safe sharing their ideas in front of the instructor and their peers.

Gender

One of the biggest predictors of who will and will not participate in class discussions is determined by gender. Aguillon et al. (2020) conducted a quantitative study to examine the effects of gender on classroom participation, in science classes particularly. After collecting participation data through observation in two introductory biology courses, the researchers found that males were overrepresented in voluntary responses, especially after small-group discussions. In a post-course survey, females reported “lower scientific self-efficacy and greater salience of gender identity” (p. 1). The results indicate that instructors need to be intentionally inclusive when incorporating active learning strategies in the classroom.

Eddy et al. (2013) reported similar results when measuring and comparing participation by gender in 23 sections of two introductory biology courses. Participation was categorized into three categories: if a student asked a spontaneous question, volunteered to answer a question generated by the instructor, or answered when called on by the instructor. A large difference was identified between male and female participation rates, Eddy et al. (2013) found that "although females on average represent 60% of the students in these courses, their voices make up less than 40% of those heard responding to instructor-posed questions to the class" (p.478). Additionally, of the 13 classes that were observed, there was not a single class in which females volunteered more responses. There was no significant difference in participation when the response was to a random call directed specifically at one student by the instructor. In order for participation rates to be more representative of the sections demographics, the use of random call should be increased.

Bailey et al. (2020) did similar research and conducted a quantitative study to compare oral participation and exam performance of males and females in introductory through graduate level life science courses at a large private university. Observers attended 34 life science courses three times each and documented participation. On average, 32% of males and 22% of females orally participated at least once during each class. Males were more likely to be considered "talkers," meaning that they orally participated more than once. Instructors called on males and females equally. Final grades were also analyzed by instructor's gender. For classes with male instructors, male students performed slightly better on average, with a significant difference observed in two of the sections. For female instructors, there was no noticeable difference in grades between males and females.

So far, the studies have consistently shown that females are less likely to orally participate in class. Others have studied the role of instructor gender in student participation. Opie et al. (2018) studied the interactive effects of individual students' gender, instructor's gender and composition of classroom by gender on participation at a small undergraduate business school. Twelve sections of the same course were observed where the courses were taught by different instructors but used the same textbooks, slides, and assessments for course material. Students were awarded points for volunteering responses and received high marks for more substantive contributions. The research study found that males had higher participation grades when there was a higher percentage of other males in the same section, regardless of whether the instructor was male or female. When females were in the minority demographic, female students scored higher when the instructor was also a female, a pattern that increased as class size got smaller.

While faculty's gender and gender composition of a class play a role in who participates, there are many other factors. Moffett et al. (2014) studied a Doctor of Veterinary Medicine (DVM) program to examine what factors encouraged or dissuaded students from interacting, asking questions and making comments in large group classrooms. In this study, 192 DVM students completed a questionnaire, and the results were analyzed. The responses showed that "aversion to public speaking" was the main reason for both male and female students avoiding speaking out during class. However, female students were 3.56 times more likely to report this fear than males. Males reported feeling more comfortable participating in class than females. Both genders reported that small-group activities and hearing other students participate increased the likelihood that they would voluntarily participate during a lecture.

While participation is lower for females for some of the reasons provided by Moffett et al. (2014), cold-calling used frequently may help close that gap. Dallimore et al. (2019) examined the impact cold-calling had on voluntary participation and if the results vary by gender. A pre-course survey, two observations, and a post-course survey were completed. In the pre-course survey, males and females scored themselves very similarly in regard to familiarity and expected participation. Females did rate themselves lower in regard to comfort levels of participating. When data was collected to compare the participation rates of students in low cold-calling and high cold-calling environment, the results showed that voluntary participation increased for both genders in high cold-calling environments and that the increase was more profound for female students.

Anxiety

Inducing anxiety in students is one reason many teachers are hesitant to practice cold-calling during large groups lectures. According to Brigati et al. (2020), classroom anxiety can impact student learning and has been shown to decrease retention for biology majors. Still, little is known about how students cope with anxiety caused by active learning practice.

Brigati et al.(2020) examined the self-reported coping strategies of students in 13 introductory biology courses in response to the active learning strategies used by the instructors. The responses of the 880 students showed that the most predominant coping strategy to manage anxiety related to clicker response questions, cold-calling and group work was adaptive, meaning it increased learning. The specific strategies used were information seeking, self-reliance and support-seeking, which were all done to prepare for class. Escape, or avoiding the situation, was the most commonly reported coping strategy for volunteering to answer a question. This result intrigued the researchers as the only active learning strategy in which students practiced

maladaptive behavior was in response to the only active learning strategy in which students get to choose whether or not they respond to the prompts.

Instructors want to help their students who are struggling in a class, but without the student telling them or asking them questions, there is no way for them to know. “A frequently-heard complaint among university faculty members is that students all too often are extremely reluctant to speak up during classroom hours and often are unwilling to participate adequately and effectively during lecture hours” (Karim and Shah, 2012, p. 228). Classroom participation anxiety was examined by Karim and Shah (2012) to determine if there was a difference in levels of classroom anxiety between males and females, and also if there was a difference between and domestic and international students. Self-reported questionnaires were distributed to 250 undergraduate students at a Malaysian University. Students ranked their level of classroom participation anxiety on a scale from one (meaning not anxious at all) to 25 (meaning highly anxious). The results of the questionnaire did not show any statistically significant difference of self-reported classroom participation anxiety between males and females. The results of the questionnaire did show that Malaysian students were more likely than their non-Malaysian classmates to report higher levels of classroom participation anxiety. Karim and Shah (2012) attribute this difference to anecdotal data suggesting that Malaysian students are far more reticent than their non-Malaysian classmates. A student’s culture is an important consideration when analyzing results.

Active learning styles such as cold-calling can increase or decrease anxiety, depending on how the strategies are implemented. In order to examine how student’s respond to different implementations, Cooper et al. (2018) interviewed 52 students enrolled in large section, active learning college courses. Students reported “fear of negative evaluation” by both instructor and

peers as a leading cause of stress associated with cold-calling. Students reported that anxiety related to cold-calling can be reduced if the instructor allowed think time and small-group work time prior to cold-calling.

Doty et al. (2020) studied student perceptions of cold-calling using graduate teaching assistants (GTA) in undergraduate chemistry and physics labs. Prior to teaching the course, the GTA participated in active-learning tutorials and practiced cold-calling combined with error framing. Eleven students from sections taught by the trained GTAs were recruited to participate in interviews. Ten out of 11 students reported increased anxiety with cold-calling, but they also reported that the error framing strategies implemented by the GTAs reduced their anxiety. One student stated that the "GTA's response mitigated their nervousness with cold-calling as the GTA emphasized effort over correctness."

Best Practices

Examining participation rates by demographics and understanding both motivators and barriers to participation can help us intentionally create more inviting classroom discussions. After reviewing literature concerning active engagement from students, Holland and Lawrimore (2011) of Francis Marion University wrote an article detailing a specific strategy called "luck of the draw," where cards are drawn to determine who will answer a question instead of the instructor choosing. This strategy reduces the student perception that the instructor is using cold-calling punitively. Additionally, using a method that selects students at random also removes teacher bias in student selection.

Wiest and Pop (2018) from the University of Nevada provide recommendations for maximizing the contributions of all students during class discussions. One way to prevent one

student from dominating class conversations is to create a comfortable climate in which students feel safe taking a risk. Instructors can contribute to a comfortable climate by showing interest in students and supporting them with eye contact and smiles. When a student participates, the instructor should listen carefully, respond with probing questions and praising student effort.

According to Doty et al. (2020) from the University of Central Florida, cold-calling paired with error-framing encourages risk taking by teaching students that mistakes are a natural part of the learn process. The successes Doty et al. (2020) had were achieved by "stating that students should expect to engage in "productive failure," and by responding to student errors with reassuring comments their ideas were "common and reasonable" (p. 3). Several of the students interviewed after the investigation reported that the GTA calling on them by name also made them feel more comfortable participating.

The impact of gender, anxiety and instructor interactions have been well researched at the collegiate level. Studies have repeatedly shown that females are less likely to orally participate than males (Aguillon et al., 2020, Eddy et al., 2014, Opie et al., 2019), many students avoid oral participation due to anxiety (Brigati et al., 2020, Cooper et al., 2018) and instructors who provide positive support to students who participate can create an environment where students feel safe participating (Doty et al., 2020), whereas cold-calling has been supported as a teaching strategy to increase voluntary participation at the collegiate level, there is little evidence of its effectiveness at the middle school level.

Methodology

In order to examine the effect of cold-calling on voluntary participation in a middle school science classroom, a causal comparative study was conducted at Indianola Middle School. Instructional coaches observed a total of 81 students in four different sections of eighth grade

science. Two of the sections were taught by Teacher A who frequently uses cold-calling during class discussions, and two of the sections were taught by Teacher B who does not use cold-calling at all.

The four observations took place in classes periods where the exact same topic, presentation and questions were asked in the same order by the two teachers. Five identical questions were asked as a warm-up with Teacher A using cold-calling and Teacher B using voluntary responses. For the second set of five questions, data was collected while both teachers relied on only voluntary response.

The instructional coaches were provided a document that listed the five questions for which only voluntary responses were accepted. Space was provided to record the total number of students present and the number of students who raised their hand for each question. The data for the first two sections was collected on a Friday, and the second set of data for the other two sections was collected on the following Monday due to block scheduling. A two-way ANOVA test was calculated to determine if there was a statistically significant difference in voluntary participation between students in sections with high-frequency cold-calling and students in sections with no cold-calling.

Permission was granted by administration at Indianola Middle School to conduct this research in the classroom. Northwestern College granted IRB exemption status as it was unlikely that any students will be adversely affected by this research.

Findings

Data

Table 1

Teacher B (low-frequency cold-calling) Group #1 Voluntary Participation

Question	Total number of students in the classroom	Number of students who raised hand 1st time question is posed	Percent of students who volunteered answers 1st time question was posed
1	18	4	22%
2	18	3	17%
3	18	3	17%
4	18	5	28%
5	18	5	28%

Table 2

Teacher B** (low-**frequency cold-calling) Group #2 Voluntary Participation

Question	Total number of students in the classroom	Number of students who raised hand 1st time question is posed	Percent of students who volunteered answers1st time question was posed
1	24	2	8%
2	25	3	12%
3	25	3	12%
4	25	3	12%
5	24	2	8%

Table 3

Teacher A (high-frequency cold-calling) Group #3 Voluntary Participation

Question	Total number of students in the classroom	Number of students who raised hand 1st time question is posed	Percent of students who volunteered answers1st time question was posed
1	21	9	43%
2	21	9	43%
3	21	6	29%
4	21	9	43%
5	21	7	33%

Table 4

Teacher A (high-frequency cold-calling) Group #4 Voluntary Participation

Question	Total number of students in the classroom	Number of students who raised hand 1st time question is posed	Percent of students who volunteered answers1st time question was posed
1	21	4	19%
2	21	6	29%
3	21	3	14%
4	21	5	24%
5	21	2	10%

Results

Table 5

Group Statistics				
	N	Mean	Std. Deviation	Std. Error Mean
Teacher A	42	1.43	2.097	.324
Teacher B	42	.81	1.784	.275

Data Analysis

One way ANOVA

A one-way analysis of variance was conducted to determine the extent to which there was a difference in students volunteering answers based on frequency of cold-calling. The independent variable included two levels: high-frequency and low-frequency cold-calling. The dependent variable was the number of students that volunteered answers. As shown in Table 5, the ANOVA was not statistically significant: $F(1, 82)=2.12$, $p=.149$, $\eta\ 2=.025$.

Table 5

Independent Samples Test									
	Levene's Test for Equality of Variances		T-test for Equality of Means						
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper
Equal variances assumed	5.485	0.22	-1.457	82	.149	-.619	.425	-1.464	.226
Equal variances not assumed			-1.457	79.946	.149	-.619	.425	-1.464	.226

Independent Samples *t*-test

An independent-samples *t*-test was conducted to determine the extent to which there was a statistically significant difference in students volunteering answers to questions based on frequency of cold-calling. Levene's test for equal variances was significant. Results of the analysis are reported using the adjustment for equal variances not assumed. As shown in Table 6, the independent samples *t*-test was not statistically significant: $t(79.946)=-1.457$, $p=.149$, $d=-.318$; the mean volunteer rate of students who had Teacher A with high-frequency cold-calling ($M=1.43$, $SD=2.097$) is significantly greater than the mean volunteer rate of students who had Teacher B with low levels of cold-calling ($M=.81$, $SD=.784$). The 95% confidence interval ranged from -.747 to .113 with the value of zero included in this range further indicates that the difference was not statistically significant.

Table 6

Independent Samples Effect Sizes				
	Standardizer[a]	Point Estimate	95% Confidence Interval	
			Lower	Upper
Cohen's d	1.947	-.318	-.747	.113
Hedge's correction	1.965	-.315	-.741	.112
Glass's delta	2.097	-.295	-.726	.139

Discussion

Summary of Major Findings

The purpose of this study was to determine if there was a significant difference in voluntary oral participation between groups of middle school science students in classrooms where cold-calling was used frequently compared to one where cold-calling was rarely used.

Although the students in sections with high-frequency cold-calling had higher rates of voluntary participation for every question, the over difference between the groups was not significant.

Limitations of the Study

There are several limitations that may affect the reliability of the results. One of the limitations of this study was the number of students who were included in this study. Approximately one-third of eighth grade students at Indianola Middle School were included due to time constraints of our instructional coaches. A larger sample size would provide additional data to support or not support our findings.

Due to our block scheduling, two of the sections were observed on a Friday and two of the groups were observed the following Monday. One group from each teacher was observed on each day. This difference may have altered participation in either group due to the lapse in time between first learning the material and then reviewing it either two or four days later.

Further Study

The majority of current research on cold-calling occurs in college classrooms. Further research is needed to examine how cold-calling effects elementary, middle school, and secondary students. If more students are able to build and keep confidence in voicing their ideas in front of peers, the diversity of voices and ideas shared in all settings could potentially increase.

Conclusion

Increasing engagement in academic settings is a challenge that most teachers work to achieve. In collegiate settings, cold-calling has been shown to significantly increase voluntary participation for both males and females (Dallimore et al., 2012). Whereas the results of this

action research did not show a significant difference between the two groups, the groups with high frequency cold-calling did have higher rates of participation for every question measured. This study suggests that cold-calling is a strategy that may be worth considering at the secondary level if an instructor can use it consistently to help prepare students for the next step in their education.

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