An Examination of Response Requirements Associated with Teachers' use of Different Opportunities for Student Response During Instruction

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Abstract

Providing effective instruction that increases the degree to which students are engaged with the instructional content has been identified as a research-based practice in that it is associated with positive academic and behavioral outcomes. One high-leverage practice for engaging students is the provision of opportunities to respond (OTR) during instruction. However, previous research has shown that teachers at every level typically use OTRs at rates far below research-based recommendations. This study adds to the literature by breaking OTRs into verbal, non-verbal, and partner categories to further examine how teachers typically foster student engagement. Across 1095 total observations, OTR rates were observed to be higher than previous research. However, teachers at every level were found to use simple verbal questioning greater than 75% of the of the time they provided an engagement opportunity. A discussion focuses on what this implies for students with verbal deficits and on practical implications and areas for future research.

Keywords

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Student attention to task and challenging behaviors have long been cited by teachers as among the most stressful components of their job (Westling, 2010). But in the recent age of COVID-19, the lack of consistent school attendance has resulted in widespread reporting of even greater challenges with student behavior in the classroom (Belsha, 2021). In terms of attention to task, teachers report student disengagement and apathy toward instruction to be the most prevalent and problematic misbehaviors with which they deal (Alter et al., 2013). In terms of challenging behaviors, teachers continue to identify student disruptions during instruction as the the most difficult and challenging issues that they face daily (Reinke et al., 2013; Simonsen et al., 2010). An inability to effectively deal with these challenges often leads to teacher burnout and stress (Hill & Flores, 2019; Landers et al., 2008; Wang et al., 2015), which is a major contributor to teachers leaving the field of education at such an alarming rate (Madigan et al., 2021).

An easy-to-implement solution to this problem is providing effective instruction that increases the degree to which students are engaged with the instructional content (Brophy, 2006; Christenson et al., 2012). Research has shown that students who are engaged in effective instruction are less likely to exhibit problem behavior (Gage et al., 2018; Rivkin et al., 2005) and more likely to experience academic success (Greer-Chase et al., 2002; McIntosh et al., 2006). Therefore, implementing strategies to improve academic engagement during instruction can prevent problem behavior in the classroom and increase academic achievement (Scott & Gage, 2020).

One method of engaging students is for the teacher to plan for and provide specific opportunities for students to respond (OTR). An OTR can be defined as the interaction between a teacher's academic prompt and a student's response (Sprick et al., 2006). Conceptually, OTRs can be viewed as being part of a three-term contingency learning trial in which the teacher asks a question or gives an academic prompt that is directed at an individual or group of students (antecedent); the student(s) respond to the prompt (behavior), and this allows the teacher to give the student(s) feedback (consequence; Haydon et al., 2012).

For both students with and without disabilities in general and special education classrooms, research supports the provision of OTRs as an effective instructional strategy (Fitzgerald Leahy et al., 2018; MacSuga-Gage & Simonsen, 2015; Sutherland & Wehby, 2001). Sutherland and Wehby (2001) conducted a literature review on the relationship between the provision of OTRs and the academic outcomes of students with emotional and behavioral disorders (EBD). Their findings indicated that an increase in OTRs was associated with an increase in task engagement, decrease in disruptive behavior, and improved academic achievement. MacSuga-Gage and Simonsen (2015) and Fitzgerald Leahy et al. (2018) extended the results of Sutherland and Wehby (2001) by conducting literature reviews for students with and without disabilities. Both systematic reviews indicated increased rates of OTR positively impacted academic and behavioral outcomes for all students, including those with EBD (e.g., Adamson, 2013), learning disabilities (e.g., Davis & O'Neill, 2004); Autism Spectrum Disorders (ASD; e.g., Blood, 2010); and other health impairments (OHI; e.g., Blood, 2010). Additionally, recent research has identified higher rates of OTR to be associated with lower rates of suspension and, for the combination of OTR and positive feedback, to be associated with an increase in the

percentage of students at the proficient and distinguished levels in both reading and mathematics (Scott & Gage, 2020).

Research has shown that OTRs delivered to students at a rate of at least three per-minute during instruction are associated with significantly higher rates of student active engagement and significantly lower rates of student disruption (Gage et al., 2018; Sutherland et al., 2003). Despite this fact, naturally occurring OTR continue to occur at rates far below this recommended level at every level (elementary = .97/min, middle school = .69/min, high school = .53/min; Scott et al., 2017). And unfortunately, students with disruptive behaviors receive fewer teacher-delivered OTRs and are significantly less engaged in instruction when compared to their peers without behavioral challenges (Hirn & Scott, 2014; Scott et al., 2011; Scott et al., 2017).

Types of OTR

In general, there are three types of student responses that can be prompted by an OTR: verbal responses, non-verbal responses, and partner responses (Whitney et al., 2021). The most common type of response is verbal in which a teacher prompts a student(s) to orally state a response. Verbal responses can include both individual and choral responding. Examples of verbal response prompts include, "Alexander, can you tell me how many continents there are?" (individual); "Can anyone tell me how to solve this equation?" (individual); and "We are going to say the days of the week…Everyone." (choral). The second type, non-verbal responding, elicits student responding through the use of manipulatives, a written product, or with an action. Non-verbal responses can include both individual and unison responding. Examples of non-verbal response prompts can include the teacher asking students to use their laptop to research what kind of tissue is muscle, bone, and fat (manipulatives); the teacher asking students to write a brief summary of a topic being discussed (written); and asking students to agree or disagree with a statement using a thumbs up or thumbs down. The third type of responding, partner responses, is an element of cooperative learning where students work together to formulate a response. Partner responses can incorporate both verbal and non-verbal responding. Partner response prompts can include the teacher asking students to turn and talk about a specific topic (verbal) or having students working together to answer a math problem on a response slate (non-verbal).

To date, research on OTRs has focused mainly on frequency (rate per minute), with some breakdown by group and individual responses (see Scott et al., 2017). In addition to identifying the crucial rate of three per-minute, this research found that mixed responding is most effective when it is delivered at a ratio of 70% unison responding and 30% individual responding (Haydon et al., 2010; Haydon et al., 2013). However, there have been no studies that have looked at OTRs in terms of how teachers use the types of required student responses. The purpose of the current study was to examine the frequency of a range of different types of teacher-directed OTR. This information will be useful in further considering the manner in which teachers attempt to engage students during typical classroom instruction.

Method

Settings and Subjects

Observations occurred in 49 classrooms across the midwestern United States. Upon gaining consent from the district and individual school administrators, observations were conducted in every classroom in which instruction was occurring. Prior to beginning a classroom observation, observers coded for the school level (i.e., elementary, middle, high) and the course content area: reading/literacy (including English Language Arts), math, science, social studies, art, advanced placement (AP), practical living, English as a second language (ESL), and world languages (any language other than English).

Teacher-Student Behavior Measures: Data Collection Procedures

Data were collected through direct observations in classrooms using The Multiple Option Observation System for Experimental Studies Version 3 (MOOSES™, Tapp et al., 1995) software program. An element of the MOOSES program, "Minimoose™", was used to develop a code file using handheld tablets. All observations were conducted by trained observers who received training with the operational definitions of the teacher and student variables and in use of the handheld device. The criteria for collecting project data included two training steps: (1) instruction followed by demonstration of 80% interobserver reliability with trainers using videos of classrooms, and (2) 80% interobserver reliability with trainers in actual classroom settings. Thereafter, reliability between data collectors and trainers were conducted during approximately 25% of observations to address the potential for observer drift. Any observer assessed to fall below 80% interobserver reliability was returned to step 2 of the training protocol.

Upon entering a classroom, observers stood in the back of the room, the "START" key on the handheld device initiated the observation as a countdown from 900 seconds (i.e., 15 minutes of observation). The session timed out upon reaching zero and the observation was saved. Upon completion of a set of observations, code files were emailed to a coordinator for storage and analysis. The 15-minute observation duration was selected based upon previous research indicating that such is appropriate for reliable observation (Rowley, 1978; Scott et al., 2017).

Each individual frequency event signaled the coder to enter a specific code. Duration events were coded whenever that behavior or activity occurred for five uninterrupted seconds. That is, if a student was actively engaged with a task but looked up to see a person entering the room, the code was not changed to off task unless the student maintained this behavior for a full five seconds. This rule prevents quick movement between codes and provides a more accurate depiction of the way teachers and students normally engage in the classroom.

Teacher Variables (Measures)

Opportunities to Respond

Opportunities to respond (OTR) were defined as any instance in which the teacher asks for (e.g., "can you tell me the answer") or prompts (e.g., "show me the answer") a student response that could be verbal, a gesture, or demonstration of a skill. This did not include

questions unrelated to academic content, corrective questions, or directions not related to the curriculum (e.g., "pull out your books"). Opportunities to respond were recorded as a group OTR (directed to the entire group) or as an individual OTR (directed solely to a single student). Further, differentiation was made regarding the specific type of OTR the teacher used, including verbal responses, choral/unison responses, response cards, gestural responses, peer discussion, and responses using manipulatives.

Verbal Responses. Verbal responses were defined as a teacher's instructional/curriculum statement/request requiring a verbal response from a class, group, or individual student. Rhetorical questions do not require a response and thus were not considered an OTR. When a verbal OTR occurred simultaneously with another type of OTR, the other type of OTR took precedence and was recorded.

Choral/Unison. Choral responding involved a teacher's instructional/curriculum statement/request requiring the class/group to respond verbally together. This type of OTR occurs only in a group response format.

Response Cards. Response cards is a broad name for OTRs that involved the teacher's instructional/curriculum statement/request that required a class, group, or individual student to show/display answers through paddles, whiteboards, index cards, or student response systems (e.g, iclickers, plickers).

Gestural. Gestures involved the teacher's instructional/curriculum statement/request that required a class, group, or individual student to use hands, fingers (e.g., thumb up/down, numbers of fingers), or heads (e.g., nodding or shaking) to produce an answer.

Peer Discussion. Peer discussions involved any teacher's instructional/curriculum statement/request requiring the class or group to talk/interact with their peers. This type of OTR occurs only in a group response format.

Manipulatives. Manipulatives involved a teacher's instructional/curriculum statement/request requiring a class, group, or individual student to perform an action with materials/objects such as writing on paper, typing on electronic device (e.g., laptop, tablet), or putting math blocks/magnetic letters together. Note that the manipulative is not used for the response such as it is with response cards – it is a vehicle for creating a response to be presented later.

Reliability

Interobserver agreement was assessed between the designated data collection trainer and each individual coder during 30% of observations. Observers completed the classroom variables information in collaboration before the observation began. The MOOSES^{TM} program calculated the agreement of frequency and duration recording between coders within a 5-second window. The point-by-point method of agreement was used to assess this interobserver reliability by dividing the agreements by the agreements plus disagreements, multiplied by 100 (Gast, 2010). This percent of agreement was identified for each coded teacher using the MOOSES^{TM} software and additional spreadsheet formula analysis (Tapp & Wehby, 1995).

Results

An initial 1200 unique teacher observations were completed, after which, those less than the full 15-minutes in duration and any data with missing information were omitted. This resulted in a total of 1095 observations, the breakdown of which is presented in Table 1.

Table 1
Observations by Grade Level and Content Area

	Elementary Schools	Middle Schools	High Schools
Total schools	26	11	12
Total observations	382	322	391
Reading	212	98	113
Math	134	83	95
Science	11	62	62
Social Studies	19	65	68
Arts	2	9	14
AP	0	1	10
Practical Living	4	3	14
ESL	0	0	7
World Language	0	1	8

Note. Total Schools = Total schools observed; Total Obs = total observations conducted across all schools.

Elementary observations took place across a greater number of schools simply because there typically are fewer teachers in elementary schools, compared to secondary schools. Overall, the total rate of OTRs was observed at rates below the research-based target of three per-minute, with elementary averaging 1.895, middle school 1.098, and high school .951 per minute. A group focus was used during 54% of all OTRs, with 46% delivered to individual students. Group and individual OTRs were observed to occur at a ratio of 1.27:1 at elementary, 1.28:1 at middle school, and 1.42:1 at high school. These rates are higher than what has previously been reported from large observation data sets (i.e., Scott, et al., 2017, 6752 observations). Further, rates of individual OTRs were even more elevated. These data are presented in Table 2.

Table 2
OTR Rates in Comparison to Previous Findings

	Total OTRs			Group OTRs			Individual OTRs		
	Elem	MS	HS	Elem	MS	HS	Elem	MS	HS
Scott et al., 2017 (6752 observations)	.97	.69	.53	.82	.62	.48	.15	.07	.05
Current Study, 2020 (1095 observations)	1.89	1.1	.95	1.04	.58	.53	.86	.52	.42

When looking at different types of response requirements, verbal (i.e., simple questioning) was used in 66% of all elementary OTRs, increasing to 76.2% at middle school and 78.8% at high school. Manipulatives were the second most frequent type of OTR at all grade levels with averages relatively even between 15.5% and 17.7%. Choral responses represented 9.5% of elementary OTRs but were rarely used in middle (.8%) or high school (2.2%). Gesture OTRs also were seen most at the elementary level (5.9%) and tended to fade through middle and high school (3.4% and 1.5% respectively). Peer discussions maxed out in elementary at 2% of all OTRs while response cards maxed out in high school at 1% of all OTRs. These data are presented graphically in Figure 1.

Figure 1
Percentage of OTRs by Type and Grade Level
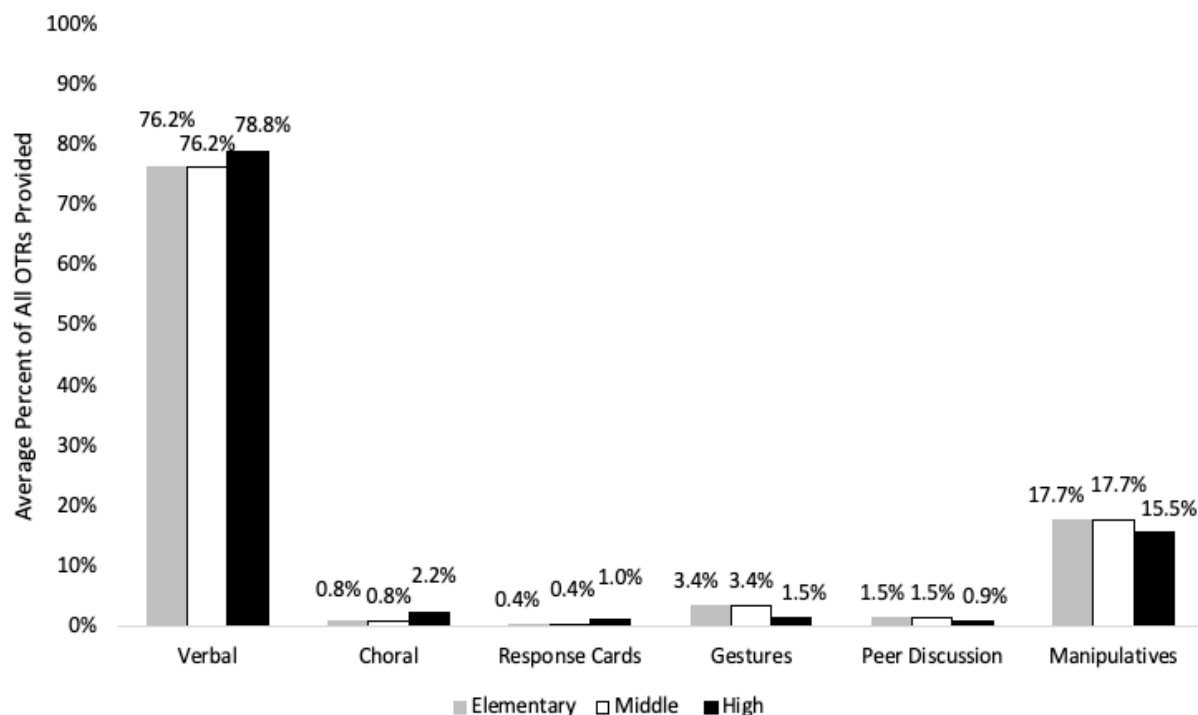
Observations occurred in all nine content areas: reading, mathematics, science, social studies, art, advanced placement (AP), practical living, English as a second language (ESL), and world languages. At elementary, reading and mathematics were most frequent, accounting for 85% of all observations with science and social studies accounting for only 3% and 5% respectively. No observations were conducted in AP, ESL, or world languages content areas at the elementary level. Both middle and high school observations were more balanced across the content areas with reading and mathematics accounting for approximately 40% of observations, science and social studies approximately 20% and others ranging from 1% to 4%. All nine content areas were observed at the high school but there were no ESL observations at the middle school level.

Looking at the three OTR categories (verbal, non-verbal, partner) across content areas, some consistencies and differences were noted by grade level. These data are presented graphically in Figure 2. First, at every grade level, verbal response OTRs were consistently used most often across the core academic content areas, with mathematics having the highest levels at each grade level, followed by reading, science, and social studies. These patterns held across non-verbal OTRs, albeit at lower levels. Partner OTRs were used at low levels in the core content areas, decreasing across grade levels with elementary ranging from 3%-8%, middle 1-2%, and high school 0-1%. Observation numbers were much lower across the non-core academic areas, representing 7% of all observations. In some cases, OTR types were seen to be used at different rates than what was seen in the core content areas. For example, partner response OTRs were observed at their highest levels in the AP courses in middle school (7%) and high school (4%).

Interobserver Agreement

Interobserver agreement was checked during 359 observations (32.8% of observations). While there was better than 80% agreement regarding the delivery of an OTR, agreement across individual OTR types was low, with the highest being verbal at .77 and peer discussion (i.e., partner category) at .88. Agreement as to whether an OTR was non-verbal was 78%, but individual agreement by type was calculated at .31 for response cards, .63 for gestures, and .67 for manipulatives.

Discussion

Overall, observed rates of OTRs, and especially individual OTRs were higher than what has previously been reported from large observation data sets (i.e., Scott et al., 2017). Being that the Scott et al. book was written in 2017, it is possible that a more intensive focus across the field of education on student engagement in general, or OTRs specifically, might account for this difference. Although, it is also possible that irregularities associated with COVID-19 changed the way teachers used their time when students were present in the school (see Limitations section below). In any case, this increase warrants some optimism as the ratio of group to individual OTRs is much closer to the 70% to 30% ratio recommended by Haydon and colleagues (Haydon et al., 2010; 2012). Still, the overall rates are only about 63% of the recommended three per-minute rate at elementary, and less than 35% of this rate at both middle and high school. While the increased rates provide some reason for optimism, there is still work to be done to increase the overall rates of OTRs to the recommended rates.

Figure 2

Percentage of OTR by Response Category, Grade Level, and Content Area
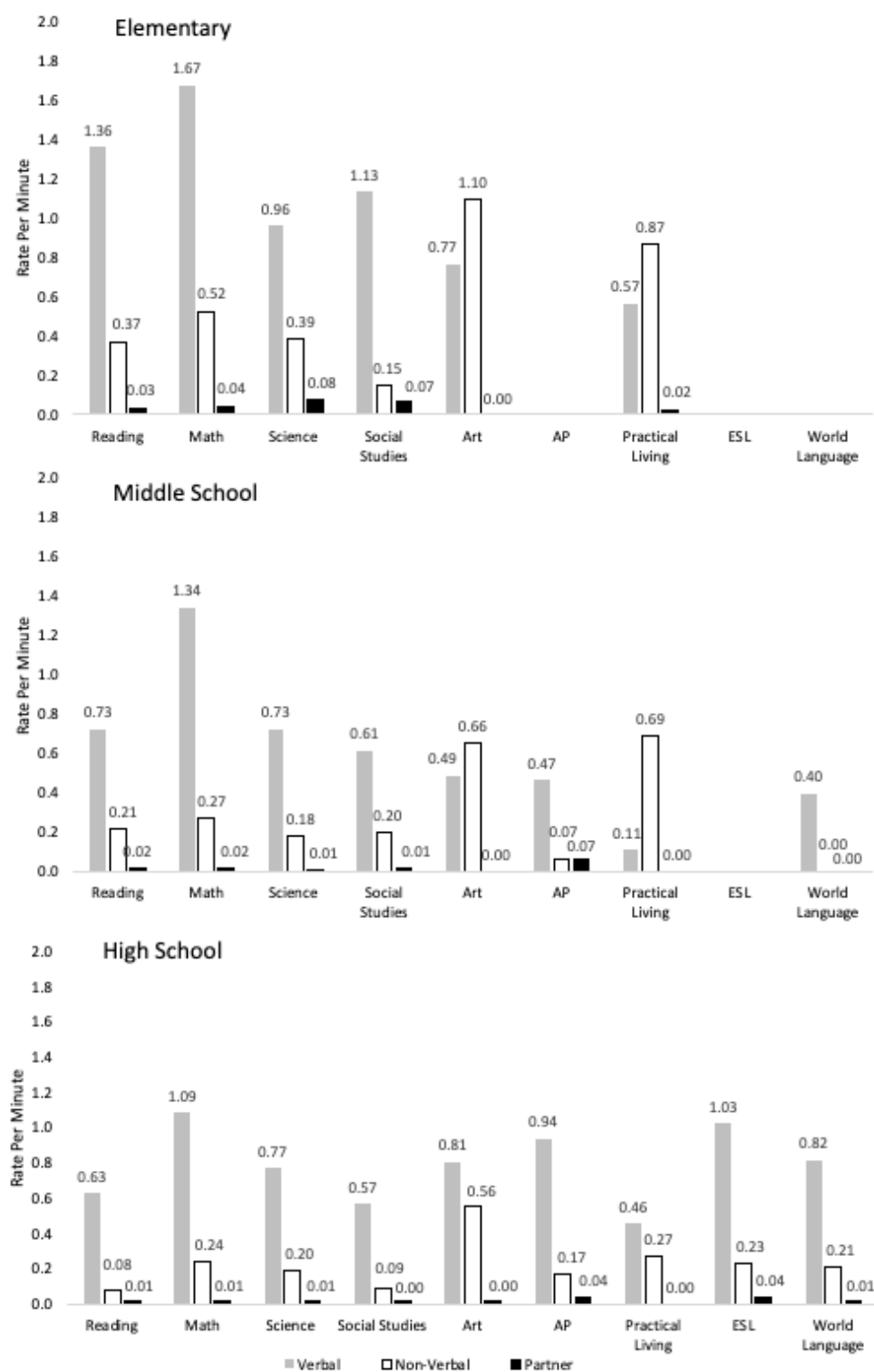
Teachers' Use of Different OTR Types

Perhaps the most prominent finding in the results is the fact that, at every grade level, better than 76% of all OTRs relied on an individual student's verbal response. It is clear that, despite a range of potential OTRs, teachers reliably fall back on simple questioning strategies. While group verbal OTRs are delivered to the class, only one student is called upon to answer. Under such circumstances it is likely that those students wishing to respond tend to monopolize the opportunities, while those less inclined are easily passed over. Of concern is how this reliance on verbal interactions impacts the engagement of students who are known to be less verbal, including students with verbal disabilities, those from impoverished backgrounds (see Hart & Risley,1995), English language learners (see Brooks-Gunn, 2019), and those with challenging behaviors (see Allen et al., 2019). This reliance on simple questioning strategies is possibly the result of training in teacher preparation programs, or it could be that those student response strategies are relatively easy to deliver without much preparation. In reality, using a variety of OTRs takes purposeful planning and delivery. Teachers should strive to include a variety of types of OTRs that correlate to the type of instruction being provided. Purposeful planning regarding the use of OTRs also has the potential byproduct of increasing the rate of delivery of OTR in addition to exposing students to a more vibrant learning experience.

Another interesting finding was that the use of manipulatives accounted for the majority of nonverbal types of OTR (56% elementary, 76% middle school, 81% high school) and the mean percentage of OTRs using manipulatives varied only slightly between grade levels. An assumption could be made that manipulatives are used more in elementary classrooms due to the emphasis on the use of manipulatives in elementary mathematics. However, the results may be attributed to the broad definition that was used to define manipulatives. These data also indicate that teachers may not be using easy and efficient non-verbal strategies such as gestures as much as they should be. This reinforces the idea that teachers are using a limited number of types of OTRs in addition to providing OTRs at less than ideal rates.

Given the academic and behavioral benefits of using engagement strategies like OTR, it is imperative that the field of education continue to promote the use of a variety of OTRs across all classrooms, content areas, and grade levels. While teachers naturally provide some types of OTRs during the instructional process, it takes purposeful planning to deliver the types and amounts of OTRs that research suggests will be most beneficial to students. This requires a hard look at the way that we prepare educators. Not all educators are trained during their teacher preparation program on specific student engagement strategies. If we expect to see educators across grade levels and various content areas providing OTRs as part of their pedagogical practices, it will take making this training a part of teacher preparation programs. This type of training can not only be part of preparation programs for select educators (e.g., special education majors). It needs to be embedded within the curriculum of the preparation programs of all teacher candidates. Additionally, there needs to be more systematic inservice training and professional development for teachers who are already practicing in the field.

Future Research

The purpose of this study was to take an initial look into the different types of OTR available for teachers to deliver during instruction. Data should continue to be collected on these teacher variables so that we can get a better picture of what is happening in all areas of

instruction, specifically with related arts. Furthermore, future studies would allow us to examine whether the impact of COVID-19 affects observed rates OTR.

Future research should include observing student variables such as passive engagement, active engagement, and disruptive behavior in order to compare how different types of OTR can impact student engagement. This could allow for the identification of specific types of OTR that would give the highest probability of student success. For example, an analysis might find that a mixture of verbal and partner responses may be most effective for elementary math and non-verbal and manipulatives may be most effective of high school science. This, in turn, would influence how pre-service and inservice teachers are trained to deliver OTR.

Limitations

The data presented in this paper must be considered in light of multiple limitations. First, across all 1095 classrooms, every teacher was observed for only 15-min during instruction. While rates of teacher behavior in these schools approximate mean rates from much larger observational studies (see Scott et al., 2017), it is possible that these single-instance observations created a type of reactivity, in some way changing teachers' behavior (Haynes & Horn, 1982). Second, interobserver agreement (IOA) rates for individual OTR types were often quite low. This likely is due to a combination of the novelty of the code definitions and the very low frequency with which many were observed. Verbal response type OTRs were by far the most frequently observed and had much higher IOA. Discussion with observers found that they had trouble discerning whether a teacher prompt to the group was meant as a choral prompt if all students yelled out an answer. In addition, observers reported some difficulty with regard to non-verbal OTR types as teachers sometimes asked students to use multiple types at one time, or even at times had students use manipulatives in the manner of response cards. Clearly, these definitions require refinement and the addition of some decision rules to solve confusing situations. However, the general categories of verbal, non-verbal, and peer discussion were more reliable and still provide valuable information about how teachers use them across grade levels and content areas.

These observations were conducted during the 2020-2021 school year, at which time schools were in and out of session due to COVID-19. Observations were conducted during times when schools were in session, sometimes immediately after a prolonged period of homebound virtual instruction. What effects this may have had on teacher's instructional behaviors are not clear. In addition, the number of observations in non-core content classes (i.e., art, AP, practical living, ESL, and world language) was very low, in some areas representing only a single observation. No conclusions can be drawn from these data and we have included it because it is unique to the literature and may offer an impetus to the field to consider instruction across the range of possible content areas. Finally, what impact the frequency of OTRs or differential effects across OTR types might have on students cannot be determined. Frequencies of disruptive behavior were far too low to permit analyses and engagement/off task levels would require observations of individual student behavior for which this study did not have IRB approval.

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