The effectiveness of the jigsaw approach

The purpose of this research was to study and analyze the effectiveness of the jigsaw method and other cooperative learning strategies for students with learning disabilities. A 20-question survey about cooperative learning strategies, including the jigsaw, was used to determine educators' knowledge of the jigsaw approach and the effectiveness they have had using it with students with and without a disability. Research findings indicate that educators believe cooperative learning does have a positive impact on their students learning new material. Concerns still exist with educators' knowledge of cooperative learning strategies and how to properly implement them in the classroom setting.

Cooperative learning strategies have been used to improve student achievement for many years. The effectiveness of these strategies, for students with and without disabilities, has been debated. The jigsaw method is a specific strategy that involves students working together and teaching their peers new material. Educators' knowledge of cooperative learning is an important aspect for implementing specific strategies, like the jigsaw method. This study is focused on educators' knowledge and their opinion on the effectiveness of cooperative learning for students with and without disabilities. The concern of a need for professional development was also examined as a way to increase knowledge of cooperative learning strategies.

Review of Literature

Cooperative learning is a strategy that has been a part of the education world for many years. It was developed out of the theory of constructivism. It has expanded from its original design of just having students work together with a partner or small group. The effectiveness of cooperative learning has

been demonstrated through numerous studies as an effective strategy to increase student's comprehension (Bigge & Stump, 1999, Law, 2011, Santos Rego & Del Mar Lorenzo Moledo, 2005). Law (2011) found, " that students' higher-order reading performance could be enhanced through engaging in cooperative learning activities with well-planned scaffolding by their teachers" (p. 416).

Cooperative learning has traditionally been looked at in the general education classroom, but it can also be used for working with students with special needs. Numerous strategies fall under the category of cooperative learning. One particular research-based strategy that has demonstrated effectiveness for increasing student understanding is the jigsaw method. The jigsaw falls under cooperative learning because it allows students to work together to learn new material. According to Bigge and Stump (1999), " for cooperative learning to be effective, students need ample opportunities to solve problems as a group first and then resort to teacher assistance" (p. 121). Göçer (2010) suggests the jigsaw approach should be used mainly in teaching grammar and literature. The jigsaw approach is just one of many cooperative learning strategies that has demonstrated effectiveness, but does have weaknesses as a strategy for students in general education as well in special education.

The jigsaw approach was first developed by Elliot Aronson (1971) to help students develop their social and cooperative skills. The original purpose was to deal with desegregation issues in Texas, but as it was being implemented, it was discovered that students were gaining a better understanding of the

content. There have been numerous studies since then to demonstrate its effectiveness in increasing student understanding.

To implement the jigsaw approach, a step-by-step process needs to be followed. Step one is that each student must be a member of two groups. The first group is the home group where students will begin and end the activity and there should be no more than five students in each group. The main responsibility of each member in home group is to teach a portion of the assigned reading/work. Once students are assigned their section they will move to a second group called the expert group. During this step, students discuss the reading/work and gain an understanding until they feel comfortable with presenting the material to their home group. In the final step, students return to their home group and take turns presenting the information they became “ experts” on and listen as other students present their material. In the end, all students have been taught the reading/work without having to do all the work on their own (Fisher, Brozo, Frey, & Ivey, 2007).

Research provides guidelines for how long students should work in their expert group before they return to their home group. Most studies support part of a given class period, but one study suggests much longer. Young, Hadgraft, and Young (1997) support using shorter periods of time between bringing the expert groups back to their home groups because when the time was expanded they encountered more problems in getting all the material together.

The jigsaw approach has also been evaluated for use in the online setting, which is becoming more important to the educational system due to an increase in online education. Weidman and Bishop (2009) found mixed results when using the jigsaw in an online classroom. The struggle came with the individual accountability component of the assignment that was amplified in the online setting. One positive was that it demonstrated increases in student understanding.

Benefits of the Jigsaw

The jigsaw approach has demonstrated numerous benefits for students of multiple ability levels. Santos Rego and Del Mar Lorenzo Moledo (2005) indicate that the jigsaw technique improved academic performance with students at the beginning of secondary school (ages 12-14 years). The authors connect this finding to students having a higher self-esteem and self-efficacy. They demonstrated that the jigsaw method can be effective at the high school level with both general education and special education students.

A similar strength of the jigsaw is that it can do more than just teach students content material. It can help motivate them and teach them to enjoy learning which can increase self-esteem and self-efficacy. Mengduo and Xiaoling (2010) concluded that, “ The jigsaw classroom reduces students’ reluctance and anxiety to participate in the classroom activities while increasing self-esteem and self-confidence” (p. 122). This is important to learn at the high school level because students are preparing for their future and need to learn how to participate in group activities. Efe and Efe (2011) analyzed how students assigned as group leaders in the jigsaw

helped motivate the rest of the group. Results suggested that when given the title of “ group leader” students worked to motivate other students to complete their work. Education is not just about learning the four core content areas (math, science, English, and social studies), it is also about learning how to interact in society and be a productive citizen. In addition to helping students learn new material, the jigsaw helps build social skills. Anderson and Palmer (2001) reports that the jigsaw approach is backed by research showing it to motivate students to work together, share ideas, pursue common goals, and develop self-esteem. Learning the material, being able to work in groups, and knowing how to motivate people are all positive attributes for success in the work place. Whether it is learning material, building self-esteem, or knowing how to motivate, the jigsaw can be utilized to help students with and without disabilities.

A final strength of the jigsaw is that it can decrease students’ anxiety levels. Many students deal with anxiety throughout their educational careers either in a specific subject, in all subjects, or with test anxiety. Oludipe and Awokoy (2010) examined students’ anxiety levels in relation to participation in chemistry class. Students were divided into two groups; one in a cooperative learning classroom that used the jigsaw approach and the other using a traditional lecture approach. The results showed that students in the cooperative classroom had lower levels of anxiety due to the positive interdependence attribute of the jigsaw method. Positive interdependence allows students to see that success is dependent on their effort and the contributions of the group. Oludipe and Awokoy (2010) conclude that

students “ became more confident and felt secure participating actively in chemistry lessons” (p. 35).

The jigsaw method also provides a way to help students become active in classroom activities and/or lessons. When students are anxious or sometimes even afraid to contribute, they are going to miss information that is needed to fully understand the material. The jigsaw allows students to work with one another and develop a sense of being needed. When students are needed by their peers, they are more likely to do the work and contribute to the group, and when they do the work, they are less anxious to become involved in future activities. It can also be used early in the school year to help students get to know one another, as it is useful for social skill development as well.

Limitations of the Jigsaw

The use of the jigsaw approach does have several limitations as well. The first relates to the teacher. A jigsaw is dependent on a teacher explaining how to properly implement the approach and if not done properly, the likelihood of success is limited. Souvignier and Kronenberger (2007) aimed to determine the effectiveness of the jigsaw approach at the elementary level by comparing three conditions of instruction (i. e., jigsaw, jigsaw with a supplementary questioning training, and teacher guided instruction). The results showed that students used the jigsaw method with average results. The authors determined that younger, elementary-aged students could benefit from the jigsaw, but only if certain conditions were met. The authors suggest that, “ cooperative learning in younger children needs as well explicit (preparing experts as teachers; questioning and explanation training)

as implicit (fostering interdependence by adequate learning materials) support" (p. 769). The jigsaw seems to be limited in its use with elementary students due to the fact that it requires more specific training for the students before it can be used as successfully as it is for older students which can be a deterrent due to time limitations and classroom demands.

Another limitation of the jigsaw approach is the actual data that supports the use of the jigsaw method. As previously noted, the jigsaw approach can be time consuming and difficult to implement. A study examined the jigsaw approach and found that students using the jigsaw performed better than students using a traditional teaching method (Dollard, & Mahoney, 2010). Then results showed only a 0. 9% increase on a test favoring the jigsaw method. Thus Dollard and Mahoney (2010) concluded, " 0. 9% is not enough of a difference to conclude with certainty, that the Jigsaw Method is a stronger academic tool than the traditional method of lecture and note taking" (p. 12). The participants were in the 8th grade, supporting the finding that the jigsaw method may not be as effective with younger students.

A final limitation is related to the findings of Souvignier and Kronenberger (2007), in that it deals with the proper implementation of the jigsaw steps by younger students. This study involved a group of seventh graders who, according to their science teachers, had experience using the jigsaw approach. The purpose of the study was to determine the effect on student learning of the jigsaw approach and another cooperative learning approach. Results showed that neither approach enhanced students' understanding of specific science concepts (Zacharia, Xenofontos, & Manoli, 2011). However, a major component of the jigsaw approach was left out by the students

involved in the jigsaw method. According to Zacharia and colleagues (2011), “ In particular, after the students returned to their home groups from their expert groups, they engaged in a working mode similar to the TCA one, in which students visit together all the websites, discuss and take notes, rather than teaching each other about the portion of websites they were assigned to them for study” (p. 417). These results again support the idea that younger students have a more difficult time following the precise steps involved in the jigsaw method. Teachers in the study reported that students knew the jigsaw method, but when put into action, they skipped the important step of teaching the other members of their group about the area they became an expert on. The step of teaching information to the other students is the main component in the jigsaw approach. If this step was left out, it is clear the students in this study were actually not comfortable or skilled in using the jigsaw approach.

Cooperative learning has its roots in the constructivist approach, which entails using experience-based activities. The jigsaw approach allows students to experience learning and contribute to their learning. Tamah (2007) states, “ Students are encouraged to learn from their fellow students in their expert team and when they go back to their home team they are encouraged to teach one another the material they have worked on in the expert team” (p. 13) which describes exactly how the jigsaw approach should work in a classroom. This approach sounds ideal for teachers because it allows the students to be actively engaged in teaching one another. The jigsaw also allows the teacher to be a facilitator, not a director in the classroom, which is a trend in schools today.

As outlined, the jigsaw has multiple strengths and limitations. The overall strength is that it is most effective with older students and effective in motivating students to learn as well as to become more confident in their abilities. The jigsaw is an approach that needs to be taught by the teacher and even modeled to ensure every student fully understands the process. A major limitation of the jigsaw is that if it is not fully and properly implemented, students will not gain an understanding of the material they need and perhaps even miss information because it was not taught to them by their other group members. This weakness tends to be amplified when dealing with younger, elementary students. Current research on the jigsaw approach has mainly been done at the middle to high school level with a balance in learning abilities. However, there are many questions that still exist with regard to the effectiveness of the jigsaw approach.

Students with Disabilities

One remaining question that is becoming more important to schools, relates to the effectiveness of the jigsaw approach for students with learning disabilities. McMaster and Fuchs (2002) concluded that, “ studies conducted in special education classrooms were associated with smaller effects for cooperative learning (mean effect size = 0. 27), than those implemented in regular education classrooms (mean effect size = 0. 44)” (p. 115). McMaster and Fuchs (2002) study supports the premise that cooperative learning can have an impact on student achievement for both students with and without disabilities. The aforementioned question can be answered with research focused on teacher’s knowledge of cooperative learning, specifically the jigsaw approach. Additional questions focus on the use of jigsaw in co-

teaching environments, whether the jigsaw is as effective for students with disabilities as it is for those without disabilities, and whether teachers understand cooperative learning strategies and if not, is there a need for professional development. There are several questions that need to be answered before an absolute answer can be given regarding the effectiveness of the jigsaw approach. Current literature supports and questions the jigsaw, but the questions posed above may become more important to the future of education as the wave of inclusion continues to change the way students are educated in the United States of America.

Method

The principle issue investigated in this study was how effective cooperative learning could be for students with learning disabilities. The knowledge educators have about cooperative learning strategies is key to proper implementation leading to increased student achievement. This study assessed educators' knowledge of cooperative learning, specific strategies (jigsaw, think-pair-share, and numbered heads together), and the need for professional development.

Participants

This research was conducted with teachers in a Southeastern Ohio school district and with members from a cohort of master's level preservice teachers. Participants were recruited through email invitations sent to a Southeastern Ohio school district (n= 98) and members of a master's level cohort of preservice teachers (n= 20). A total of 54 surveys were submitted for a response rate of 46%. All participants were currently educators or working on licensure to enter the field of education with years of teaching

experience ranging from 0 to 35 years. The participants reported a variety of teaching experiences, ranging from elementary to college. Eighteen of the 53 participants reported having experience teaching special education and 47 of the 53 participants (87%) reported they work with students with special needs daily.

Instrument

The aforementioned survey (Appendix A) was constituted of 20 questions, both open-ended and forced-choice, including demographic information, educator's knowledge of cooperative learning and specific strategies, and opinions regarding cooperative learning's effectiveness for students with and without disabilities. The fourth question asked educators to define cooperative learning. This information was important because of the varying definitions of cooperative learning. The survey asked how often participants used cooperative learning in general, and then for specific cooperative learning strategies. The survey asked about their understanding of the jigsaw method. Additional questions related to preferred cooperative learning strategies and their opinion regarding how effective cooperative learning is for students with and without disabilities. The survey concluded with a question to determine the need for professional development in the area of cooperative learning.

Procedures

After receiving approval from the university's Internal Review Board, the researcher obtained approval from the school district's superintendent to distribute the survey via email. One email was sent to the educators in the school district, while another email was sent to the members of the master's

level cohort of preservice teachers. The participants were informed that the online survey (created using Qualtrics, an online survey tool) would take no longer than 10 minutes to complete and were completely anonymous. Two reminder emails were sent asking those that had not completed the survey to do so.

Results

After the survey was closed, the researcher analyzed the qualitative and quantitative data collected with the survey. The qualitative data was used to determine educators' definitions of cooperative learning and the jigsaw approach, as well as educators' preferred strategy they used in their classrooms. Quantitative data determined how often specific cooperative learning strategies were used in the classroom, as well as ratings for how effective teachers believe cooperative learning is for students with and without disabilities. The results from 54 surveys are reported, but not every question was answered by each participant so the response rates vary by question. The results demonstrated a variety of responses in how educators defined cooperative learning as well as in their understanding of the jigsaw method. Overall, educators agreed that cooperative learning strategies are effective for helping both students with and without disabilities.

Table 1 shows how often participants use cooperative learning in their classroom. The mean value is 2. 26 (between 1-2 times per week and 3-4 times per week), with the majority of participants (53%) using cooperative learning 1-2 times per week.

Table 2 shows how often participants use the jigsaw method in their classroom. The mean value is 1. 31 (between 0 times per week and 1-2 times per week) with the majority of participants (69%) choosing 0 times.

Table 3 shows how often participants use the think-pair-share method. The mean is 2. 00 (1-2 times per week), with the majority (51%) of choosing 1-2 times per week.

Table 4 shows how often participants use the numbered heads together method. The mean score is a 2. 4 (between less than once a month and once a month), with the majority (45%) of participants choosing never.

Table 5 shows how effective participants think cooperative learning is for students without disabilities. The mean score is 4. 10 (between somewhat effective and very effective), with the majority (59%) of participants choosing somewhat effective. The participants were asked to give an explanation for their rating and there were several similarities in their wording. Many referred to it being dependent on the type and age of the students. There was also a common response that not all students are able to learn in groups and need the opportunity to work independently.

Table 6 shows participants' perceptions of the effectiveness of cooperative learning for students with disabilities. The mean score is 3. 96 (between neither effective or ineffective and somewhat effective), with the majority (51%) choosing somewhat effective. The participants were asked to give an explanation for their rating and resulting in several similarities in their responses. Several participants indicated the effectiveness was dependent on students' willingness to work with others. Others indicated it was effective

because it helped build students' social skills through interaction with other students.

Defining Cooperative Learning

Each participant was asked how he/she defined cooperative learning. Fifty-one out of the 54 participants (94%) completed this question. Of the 51, 34 mentioned that cooperative learning was focused on student grouping or students working together, while three participants defined it as " teachers working together." The remaining responses did not specify who was involved in working together, but just that it involved working in groups or together to solve a problem.

Understanding the Jigsaw Method.

Educators were asked to explain their understanding of the jigsaw method. Forty-four educators answered this question, and off the 44, 17 (39%) explained the jigsaw as " putting students into one group to learn material and then join another group to teach the material they learned in their first group." Nine of the 44 (20%) responded as not knowing what it is. The others explained the jigsaw as group work, but did not specify the nature of the groups.

Why Some Do Not Use Cooperative Learning

Educators who responded that they do not use cooperative learning were asked to explain why. Nine participants responded that they do not use any form of cooperative learning strategy. Four of the nine mentioned time as being the main reason for not using cooperative learning strategies. Other responses included lack of skills by students and forgetting to use them. One

response indicated the individual was not familiar with enough strategies and how to implement them.

Professional Development for Cooperative Learning.

The remaining survey questions dealt with the need for professional development in order to learn more about cooperative learning. Fifty-one participants' responses to a question asking whether they would benefit from professional development. Twenty-eight responded, yes (55%), 17 said no (33%), and six responded that they might benefit from professional development. This question was followed by another asking why or why not they would want professional development. Many responses indicated participants have learned about cooperative learning, but forget the specific strategies. Other responses indicated that there is always room to learn new ideas and methods for the classroom.

The final question asked participants to indicate where they would like to receive professional development. Of the 34 participants who completed this question, 24 would prefer a workshop with the remaining respondents indicating a webinar as the preferred method of delivery for professional development.

Discussion

The results indicate there is a concern with educator's knowledge about cooperative learning and how to implement specific strategies. The educators had a basic understanding, but did not fully understand cooperative learning. Many explained it as simple group work, when it involves more of an understanding that it is student-led and student-

centered instruction. The participants were also asked to give their preferred cooperative learning strategy and only 14 of 49 or 29% were able to identify a specific strategy outside of normal grouping. The participants also had a basic understanding of the jigsaw method, but did not all fully understand the idea of creating a “ home” group and an “ expert” group and students are focused on learning new material.

The other area that demonstrates a weakness in their knowledge is the fact that 32 of the 51 or 63% of the participants indicated they would benefit from professional development in the area of cooperative learning. Several participants responded that they know they need to learn more and want to have a better understanding of how the different cooperative learning strategies work. The majority of the participants would also like to attend a workshop to learn about the different cooperative learning strategies.

The results also demonstrated that educators believe cooperative learning is effective for students with and without disabilities. Forty-four of the 51 or 86% of the responses indicated that cooperative learning is either somewhat effective or very effective for students without disabilities. This demonstrates that educators have confidence in these strategies for students without disabilities. The results also show that 41 out of 51 or 80% of the participants believe cooperative learning is somewhat effective or very effective for students with disabilities. The study demonstrates the effectiveness of cooperative learning, but there is still the concern of the participants not fully understanding what cooperative learning is and how to implement the different strategies.

The primary purpose of this study was to determine the effectiveness of cooperative learning for students with disabilities. The researcher believes that cooperative learning strategies can have a positive effect on student achievement, but educators need to fully understand the strategies and how to properly implement them. Many of the participants (80%) support the idea that cooperative learning is effective for students with disabilities. Some participants cited social skill development and self-esteem building as reasons why they think cooperative learning can be effective for students with disabilities.

The results from this study also indicate participants (86%) believe cooperative learning is effective for students without disabilities as well. The researcher believes this is important and demonstrates why educators need to understand cooperative learning and how to implement the different strategies.

The results did not show the effectiveness of the jigsaw method specifically, as only 17 out of 44 participants were able to define the jigsaw method. The researcher believes this indicates that the jigsaw cannot be effective if educators are not even sure what it is or how to implement it correctly. The literature supports the idea that the jigsaw method is more effective for older students, but this study does not support that by the fact that the majority of respondents in this study did not know what or how to implement the jigsaw method.

The research does show and support the study by Santos Rego and Del Mar Lorenzo Moledo (2005) that the jigsaw can create a higher self-esteem and

self-efficacy for students with disabilities. Several participants stated that cooperative learning helps students develop social skills and build self-esteem. The researcher believes this is important and supports the effectiveness of cooperative learning for students with disabilities.

Implications for Practice

The implications for this study show that there is a need for educators to gain a better understanding of cooperative learning and the variety of strategies that it entails. Professional development would benefit educators in the area of cooperative learning. The best form would be a workshop to provide them with an interactive approach that allows them to learn the strategies firsthand.

Recommendations

Further research of a larger sample might provide a better insight into the need for professional development. This could result in more generalization for teachers nationally to receive professional development on cooperative learning. Due to the small sample, this study is only able to determine the needs of one high school.

Conclusion

In conclusion, this study provides evidence that educators' knowledge of cooperative learning is adequate, but there is a need for professional development on specific strategies. Educators realize cooperative learning can have a positive impact on students with and without disabilities, but they are not confident in implementing a variety of strategies. It would be to the

benefit of the students for educators to attend a professional development workshop on different cooperative learning strategies.