The Identification of Students with Specific Learning Disability (SLD) in Subtype of Math Skill Through Response to Intervention Model

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Abstract: Until this time not many schools in Indonesia having a standardize model in terms of identification, assessment and comprehensive way to serve children especially students with specific learning disability (SLD) at elementary level. The purpose of this research is to identify the students with SLD especially students with math disabilities through response to intervention (RtI) model. The research was conduct in one of elementary school in West Java Province with 74 student with elementary level grade 1 -3. The method of used is quasi-experimental with non-equivalent control group. Using multi-level intervention program on RtI model was found several students as at-risk students after following six weeks of primary intervention and they were moved onto following secondary intervention. Differentiated of learning instruction such as multiple instructional, heuristic and visual representation strategies are used to accommodate what of students need and maximizing during intervention program on math operations and math word problems. The students who still have not demonstrated progress in nine weeks of secondary intervention are classified as students with SLD in sub-type of math skill such as math operations and math word problems. These students are needed with individualize intervention programs with one-on-one setting to achieved their academic performance as targeted school program.

Keywords: specific learning disabilities, RtI model, math intervention

INTRODUCTION

One of the part of students who need special educational services is students with specific learning disabilities (SLD). As we know that student with SLD have deficits in the basic psychological processes in SLD with sub-type of dysgraphia, dyslexia and dyscalculia (M. McDowell., 2018). It will interfere with learning and academic function and these deficits can also lead to emotional and/or behavior problems (Benson, N., & Newman, I, 2010; Backenson., EM Holland., SC, Kubas., HA, Fitzer., KR, Wilcox., G, Carmichael., JA, Fraccaro., RL, Smith., AD, Macoun., SJ, Harrison., GL, Hale., JB, 2015; McDowell., M, 2018). Therefore, it is necessary to identify in advance whether these children can be classified as SLD or not then the right intervention would be provided to achieve the learning targets expected by the school (Fuchs., D, 2012; Reeder., S, 2014; Soares., N, T. Evans., DR. Patel., 2018). Response to Intervention (RtI) is a method that providing universal screening in the general education classroom, research-based interventions for struggling learners, and ongoing progress monitoring for students who are receiving academic and behavioral interventions (Gressham, 2005; McCook, 2006; Johnson, P.H., 2011; Sullivan., JR, Fellicia., 2013; M. Gorsche., & RJ. Volpe., 2013). The students who did not respond to intervention were moved through tiers of instruction to remediate the problem before a referral to special education was made. Recently RtI is a model that used in origins country in US to be used at public or private school as a special education services such as indentifying and intervention to the students suspected with SLD. One of parts in RtI model as well as multi-level intervention is progress monitoring. Progress monitoring is a tool that used by the teachers to determine an effectiveness of

intervention was provided to the students and if any modifications are necessary (Fuchs, D., Mock, D., Morgan, P.L., & Young, C.L. 2003; Feiker, H.A., 2007; Fletcher., JM, Vaughn., S, 2009; Cakiroglu., 2015). If the students who are not response to intervention then alternate intervention can be provided to the instruction in the area of intervention. The student progress ideally must be provided and monitored frequently with biweekly and at least monthly (Fuchs, & Fuchs, 2006; Fuchs, L.S., & Fuchs D. 2007). To be effective in progress monitoring, some attributes of assessment should be included (Kovaleski, J.F., & Prasse, D.P., (2004) such as (1) develop of instructional strategies and use appropriate curriculum; (2) applicable to be monitor an individual student's progress over time; (3) repeatedly using multiple forms; (4) sensitivity of small incremental of growth over time; (5) the result of data can be summarized using data displays with teacher-friendly. Teachers can use assessment in progress monitoring to gauge the effectiveness of teaching and to adjust instructional technique to meet the needs of the individual student (S., Vaughn, JM., Fletcher, David., J, Francis, CA., Denton, J.,Wanzek, J., Wexler, PT.,Cirino, AE., Barth, and MA., Romain, 2008)

The focus on math intervention on this research were using RtI model to improve math abilities of students through suitable instructional program that increasing student's math performance. Two focus on sub-type of math skill for students grade 1 -3 at elementary level are math operations and math words problem solving (Bryant, & Bryant, 2008; Fuchs, Lynn S., Fuchs, Douglas, Craddock, Caitlin., et al, 2008). Math calculation or math operations is completing math problems where students must know concepts, strategies, and facts include decimals, fractions, percent, while math problem solving is use to understand to solve math problems such as words problems, measurement, temperature and volume (Thurber, 2002;). Like Thurber and Bryant the students who have difficulties in mathematics typically experiencing problem in sub-type of math on math words problem related with math concepts and operations they were learned (Hinton, V., Flores M.M., & Shippen, M. 2014). Previous research demonstrated that instruction on solving math word problems based on underlying problem structure leads to statistically positive effects on measure of word problem solving. This technique typically led to significant and positive effects on word-problem outcomes for students experiencing difficulties in mathematics across grade level (Xin, Jitendra, & Deat-line-Buchman, 2005).

In the RtI model with math intervention grade 1 - 3, instructional should be provided based on evidence-based-instruction for struggling mathematics learners (Bryant, & Bryant, 2008). There are some recommendations about mathematics instructional strategies for students grade K - 12 with learning disabilities and at-risk learners (Jayanthi, Gersten, Baker, 2008) such as teaching students with explicit instructional strategies that include clear modeling of the solution specific to the problem, thinking the specific steps aloud during modeling, presenting multiple examples of the problem and applying solution to the problems, and providing immediate corrective feedback to the students on their accuracy. Another instructional strategy to be provided to the students with math intervention are Multiple instructional strategies (Butler, Miller, Crehan, Babbit, & Pierce, 2003), Visual representation strategies (Xin, Jitendra, &Deatline-Bunchman, 2005), and teaching students with heuristic strategies (Jayanthi, Gersten, 2009).

METHOD

The method used is quasi experimental design with non-equivalent control group and analysis factor (ANOVA) are also used to see significant effect of intervention group during 6

weeks of intervention with level significant at .05 compare to control group in primary intervention (Tier-1). The minimum cut-off score to all areas of sub-type of math skill is 70 (scale 100). The students with below on cut-off score were suspected as student at-risk. Rate of improvement (ROI) or growth measure is used with minimum under point 1 as consensus by the school to categorized students were identified as SLD in sub-type of math skill after 9 weeks of progress monitoring on secondary (Tier-2) intervention. The participants of students consist with total 74 students on intervention group and 75 total of students on control group grade 1 - 3.

RESULTS AND DISCUSSION

Primary intervention result grade 1- 3 on sub-type of math skill

After providing primary (Tier-1) intervention during 8 weeks of intervention, significant effect did not provide on students grade 1 for math word problem solving skill with (M=64.68, SD=5.96, n=23) compare to control group (M= 67.9, SD = 7.44, n=25) at .05 level of significant (t=1.78, df=46, p> .05), and for math operations skill with (M=65.72, SD=5.2, n=23) compare to control group (M=68.78, SD=5.99, n=25) at .05 level of significance (t=1.89, df=46, p>.05). On the students grade 2, significant effect were provided for math problem solving skill with (M= 77.76, SD = 7.44, n=26) compare to control group (M=64.68, SD=5.96, n=25) at .05 level of significant (t=7.78, df=49, p < .05), and for math operations skill with (M=76.98, SD=6.83, n=23) compare to control group(M=65.72, SD=5.2, n=25) at .05 level of significance (t=4.89, df=49, p<.05). For students grade 3, significant effect were provided for math problem solving skill with (M= 79.98, SD = 4.62, n=25) compare to control group/no intervention (M=70.52, SD=3.46, n=25) at .05 level of significant (t=4.65, df=48, p< .05), and for math operations skill with (M=78.36, SD=4.83, n=25) compare to control group/no intervention (M=72.88, SD=5.2, n=25) at .05 level of significance (t=4.89, df=48, p<.05).

The number of students was suspected of students at-risk after primary (Tier-1) intervention provided during 6 weeks was shown on the table-1 and table-2 below.

Table-1. Number of responder and non-responder in math operations students grade 1-3 after primary intervention was provide

Sub-skill Math Operations	Number of responder students	Number of non-responder students
Grade-1 (n=23)	20	3
Grade-2 (n=26)	24	2
Grade-3 (n=25)	23	2

Table-2. Number of responder and non-responder in math words problem students grade 1-3 after primary intervention was provide

Sub-skill Math Words Problem	Number of responder students	Number of non-responder students
Grade-1 (n=23)	20	3
Grade-2 (n=26)	24	2
Grade-3 (n=25)	23	2

Secondary intervention result grade 1 - 3 on sub-type of math skill

After following secondary intervention in 9 weeks of progress monitoring were found some at-risk students grade 1 - 3 did not demonstrated with targeted on sub-skill of math operations and math words problem. These students with rate of improvement (slope) under point 1 were identified as students with SLD in sub-type of math skill. The number of students grade 1 - 3 in sub-type of math skill after secondary intervention was provided shown on table 3 and table 4.

Table-3. Number of responder and non-responder in math operations students grade 1-3 after secondary intervention was provide

Sub- skill Math Operations	Number of responder students	Number of non-responder students
Grade-1 (n=3)	1	2
Grade-2 (n=2)	1	1
Grade-3 (n=2)	1	1

Table-4. Number of responder and non-responder in math words problem students grade 1-3 after secondary intervention was provide

Sub-skill Math Words Problem	Number of responder students	Number of non-responder students
Grade-1 (n=3)	2	1
Grade-2 (n=2)	1	1
Grade-3 (n=2)	-	2

The effectiveness of interventions with appropriate instructions given affect to students outcome. The combination and differentiation of instruction at secondary intervention such as heuristics and visual representation have a greater effect and impact on the results that some students were identified with SLD on sub-type of math skill (Bjorn., PM, Aro., Mikko., Koponen., T, Fuchs., LS, Fuchs., D, 2018; Soares. N., T. Evans., DR. Patel., 2018). The use of problem solving protocol during the second intervention also had an impact on the results of achieving good of progress monitoring during nine weeks of intervention. These students were identified having with SLD needs supporting with individualize intervention by one-on-one setting. Different with secondary intervention that on primary intervention standard treatment protocol were applied during 8 weeks of intervention. We found during primary intervention on students grade 1 there are many learning problems such as behavior like attention against learning instruction provided by the teachers especially for students grade 1.

Not just only to find out at-risk students and identifying students with SLD even through RtI system could maximize targeted student outcome if high quality instructional are really implement ted with additional time at least-per session 30 - 40 minutes five session in weeks during supplemental services in secondary intervention. We found during four weeks that two students grade 1 - 3 did not provide with a good achievement in progress monitoring then differentiated instruction with direct and systematically instruction with more visual representation were applied and provide feedback that each 1 students grade 1 - 3 was achieved on the targeted as responder student and improve his/her academic performance until nine weeks of progress monitoring. As part of RtI system during secondary intervention progress monitoring assessment used to provide reliable data and how students are progressing related to improve academic performance in sub-skill of math skill. Progress monitoring is also provide

information of the effectiveness of instruction and modification if necessary (Vaughn, S., Wanzek, J., Muray, C. S., & Roberts, G. 2012)

CONCLUSIONS

Response to Intervention (RtI) is a practical method that providing universal screening in the general education classroom, research-based interventions for struggling learners, and ongoing progress monitoring for students who are receiving academic and behavioral interventions. The students who did not respond to intervention were moved through tiers of instruction to remediate the problem before a referral to special education was made (Mc. Master, K.L., Fuchs, D., Fuchs, L. S., & Compton, D. L. 2005; Berkeley, S., Bender, W.N., Peaster, & Saunders, L. 2009). We found some of students were identified having with SLD in the sub-type of math skill after following secondary intervention with specific differentiated instruction combination of multiple learning instructional with heuristic and visual representation. The implications of using RtI model especially for inclusive school to identify students with SLD that RtI was designed to help school teachers by making the two kinds of decisions (Glover, T. A., & DiPerna, J.C., 2007). such as (a) instructional planning to decide what and how to teach students the classroom intervention with specific instruction such as direct and systematic instructions . These instructional planning were effective in primary and secondary intervention to find out at-risk students and identification of students with SLD on sub-skill in math operations and math words problems; (b) eligibility for special education services for one-on-one setting with individualized intervention program.

REFERENCES

Berkeley, S., Bender, W.N., Peaster, & SAunders, L. (2009). Implementation of response to intervention: A snapshot of progress, *Journal of Learning Disabilities,* 42(1), 85-95.

Backenson., EM, Holland., SC, Kubas., HA, Fitzer., KR, Wilcox., G, Carmichael., JA, Fraccaro., RL, Smith., AD, Macoun., SJ, Harrison., GL, Hale., JB, (2015). Psychosocial and Adaptive Deficits Associated With Learning Disability Subtypes. *Journal of Learning Disability*, 2015, 9-10, 48(5):511-522 doi: 10.1177/0022219413511861.

Bryant, D.P., Bryant, B.R., Gersten, R.M., Scammacca, N.N., Funk, C., Winter, A., et al. (2008). The effects of Tier-2 Intervention on the mathematics difficulties. *Learning Disabilities Quarterly*, 31(2), 47-63.

Bjorn., PM, Aro., Mikko., Koponen., T, Fuchs., LS, Fuchs., D, (2018). Response-To-Intervention in Finland and the United States: Mathematics Learning Support as an Example. *Journal Frontiers in Psychology,* 2018, Vol 9. http://doi: 10.3389/fpsyg.2018.00800.

Butler, Miller, Crehan, Babbit, & Pierce, (2003). Fraction Instruction for Students with Mathematics Disabilities: Comparing Two Teaching Sequences. *Journal of Learning Disabilities Research and Practice*, 2003, May 18(2):99-111.

Cakiroglu. O., (2015). Response to Intervention: Early Identification of students with learning disabilities. *International Journal of Early Childhood Special Education*, 2015, 7 (1), 170-182.

Feiker, H.A. (2007). From IDEA to implementation: A discussion of foundational and future responsiveness to intervention. *Learning Disabilities Research & Practice,* 22, 137-146.

Fletcher., JM, Vaughn., S, (2009). Response to Intervention: Preventing and Remediating Academic Difficulties. *Journal of Child Dev Perspect,* 2009, Apr 3 (1): 30-37. http://doi: 10.1111/j.1750-8608.2008.00072.x

Fuchs, *D*., *Fuchs*, L. S., Compton, D. L. (*2012*). Smart RTI: A next generation *approach to multilevel prevention. Journal of Learning Disabilities*, 44(4), 339–347.

Fuchs, D., & Fuchs, L.S. (2006). Introduction to response to intervention: /what, why, and how valid is it ? *Reading Research Quarterly*, 41, 92-99

Fuchs, L.S., & Fuchs D. (2007). A model for implementing responsiveness to intervention. *Teaching Exceptional Children,* 35(1), 14-23

Fuchs, D., Mock, D., Morgan, P.L., & Young, C.L. (2003). Responsiveness-to-intervention: Definition, evidence, and implications for the learning disabilities construct. Learning Disabilities Research & Practice, 18, 157-171.

Fuchs, Lynn S., Fuchs, Douglas, Craddock, Caitlin, et al (2008). Effects of Small Group Tutoring with and without Validated Classroom Instruction on At Risk Students' Math Problem Solving: Are Two Tiers of Prevention Betterthan one ? *Journal of Educational Psychology*, volume 100, number 3, pp. 451-509

Gressham, F.M. (2005). Response to intervention: An alternative means identifying students as emotionally disturbed. *Education and Treatment of Children*, 28, 328-344

Glover, T. A., & DiPerna, J.C. (2007). Service delivery for response to intervention: Core components and directions for future research. *School Psychology Review*, 36, 526-540.

Hinton, V., Flores M.M., & Shippen, M. (2014). Building Mathematical Fluency for Students with Disabilities or Students At-Risk for Mathematics Failure. *Journal of Education in Mathematics, Science and Technology (IJEMST),* 2014, http://DOI: 10.18404/ijemst.69677

Individual with Disabilities Education Improvement Act of 2004, Pub. L. No. 108-446

Jayanthi., Gersten., (2009). Mathematics Instruction for Students With Learning Disabilities: A Meta-Analysis of Instructional Components. *Journal Review of Educational Research*, 2009, Sept 79(3):1202-1242.

Johnson, P.H. (2011). Response to Intervention in literacy: Problems and possibilities. *The elementary School Journal*, 111 (4), 511-534

Kovaleski, J.F., & Prasse, D.P., (2004). Response to Instruction in the identification of Learning Disabilities:*A Guide for School Teams*. National Association of School Psychologists, S8, 159-162

McCook, John E. Ed.D. (2006). The RTI guide: *Developing and implementing a model in your schools*: LRP Publications, Horsham, Pennsylvania

Mc. Master, K.L., Fuchs, D., Fuchs, L. S., & Compton, D. L. (2005). Responding to non-responder: An experimental field trial of identification and intervention methods. *Exceptional Children, 71,*445-463

M. McDowell., (2018). Specific learning disability. *Journal of Pediatrics & Child Health*, 54 (2018) 1077–1083. doi:10.1111/jpc.14168

M. Gorsche., & RJ. Volpe., (2013). Response-to-intervention (RTI) as a model to facilitate inclusion for students with learning and behavior problems. *European Journal of Special Needs Education*. Vol. 28, 2013 - Issue 3. https://doi.org/10.1080/08856257.2013.768452.

Soares. N., T. Evans., DR. Patel., (2018). Specific learning disability in mathematics: a

comprehensive review. *Journal of Translational of Pediatrics,* 2018 Jan; 7(1): 48–62. doi: 10.21037/tp.2017.08.03

Sullivan. JR., Fellicia. CV., (2013). Special Education Policy, Response to Intervention, and the socialization of youth. *Journal Theory Into Practice,* 2013, Vol. 52 - Issue 3: Educational Policy and Youth in 21st Century.

S., Vaughn, JM., Fletcher, David., J, Francis, CA., Denton, J.,Wanzek, J., Wexler, PT.,Cirino, AE., Barth, and MA., Romain, (2008). Response to intervention with older students with reading difficulties. *Journal of Learning and Individual Differences,* 2008. Sept (1), Vol 18. Issue 3. Page 338-345.

S. Reeder., (2014). Response to Intervention and Specific Learning Disability Identification Practices in Kentucky. *Masters Theses & Specialist Projects*. Paper 1365. https://digitalcommons.wku.edu/theses/1365/

Thurber, R.S., Shinn, M.R., & Smolkowski, K. (2002). What is measured in mathematics tests? Construct validity of curriculum-based mathematics measures. *School Psychology Review*, 31, 498-513

Vaughn, S., Wanzek, J., Muray, C. S., & Roberts, G. (2012). Intensive interventions for students struggling in reading and mathematics: *A Practice guide.* Portsmouth, NH: RMC Research Coorporation, Center on Instruction.

Vaughn, S., & Fuchs, L.S. (2006). A response to competing views: A dialogue on response to intervention: Why response to intervention is necessary but not sufficient for identifying students with learning disabilities. *Assessment for Effective Intervention,* 32(1), 58-61

Xin, Jitendra, & Deatline-Bunchman, (2005). The Effect of Schema-Based Instruction in Solving Mathematics Word Problems: An Emphasis on Prealgebraic Conceptualization of Multiplicative Relations. *Journal for Research in Mathematics Education*, 2008, Nov 39(5):526-551.·