

Learning Strategies for Twice-Exceptional Students

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Abstract

Twice-exceptionality student who is gifted and has additional exceptionalities challenges teachers and educators to deliver the best teaching strategies. This paper reviews the current learning strategies, interventions and practices that specifically focused on twice-exceptionality students. Research articles were obtained on online database of published articles. The scope is focused on intervention practices or instructions in behavioral, developmental, emotional, or educational areas. By making systematic review, this article summarizes 37 research studies on twice-exceptionality's interventions between 2000 and 2018, regardless of the areas of disability. The findings are categorized into five main themes, preceded by the most used in studies which is academic or learning strategy, followed by support, strength or talent-based, art or music, and technology. An effective intervention must tailor to their strengths and potentials as well as provides remediation and support for their social and emotional needs. This study is vital and meaningful for educators and parents to provide these twice-exceptional students the best intervention that suit with their own strengths and needs.

Keywords: Twice-exceptional; Learning strategies; Interventions; Gifted

Introduction

Twice-exceptional learners are commonly known as gifted students with learning disabilities. Their characteristics are diverse and different from each other. They have specific talents, higher-

level intellectual abilities, superior vocabulary and exceptional comprehension of abstract ideas and concepts, high levels of creativity, unusual imagination, but may exhibit poor reading and writing skills, lack organizational and study skills, low self-esteem, and making sophisticated humor (Buic & Popovici, 2014; Foley-nicpon, 2013; Nielsen, 2010). However, the lack of understanding of twice-exceptionality's criteria cause's parents and teachers to fail to recognized the twice-exceptionality students. Typically, twice-exceptional students fit into one of three categories (Baldwin, Baum, Pereles, & Hughes, 2015; Buic & Popovici, 2014):

Students are identified as gifted (with no diagnosed disability):

These students' disabilities are masked by their talents. Moreover, students are often considered underachievers due to poor self-concept, lack of motivation, or seen as lazy.

Students are diagnosed with a disability (with no identified giftedness):

These students' giftedness is covered up by their disability. They are rarely referred for gifted services as they often being underestimated or their potential not identified.

Students are neither identified with a disability or as gifted:

These students' are considered having average, so neither giftedness or disability is clearly distinguishable and they usually sit in general classrooms. Fail to recognize and identified the twice-exceptionality students deny their right

to sit for an effective treatments or programs to accommodate their limitations and strengthen their potentials.

For all three of these categories, specific strategies must be used to accommodate their limitations, and at the same time develop their potentials and talents. Teachers have to understand and recognize their student, then suit with the best learning strategies or interventions. An educational experiences and curriculum must suited to their strengths and potentials (Schultz, 2012). However, the culture of education which focused more on accommodates limitations, have prevented their potentials and talents to be developed (Dole, 2000; Hua, Shore, & Makarova, 2012). To date, the review of intervention for twice-exceptionality is still limited. Nicpon, Allmon, Sieck, & Stinson, (2011) study the empirical investigation of twice-exceptionality focused on Specific Learning Disabilities (SLD), Attention Deficit Hyperactivity Disorder (ADHD), and Autism Spectrum Disorder (ASD) only. Therefore, to address this need, this article summarizes 37 research studies on twice-exceptionality's interventions between 2000 and 2018, regardless of the areas of disability.

Purpose

The purpose of this study was to identify learning strategies, intervention and practices for twice-exceptionality students. This study is vital and meaningful for educators and parents to provide twice-exceptional children the best intervention that suit with their own needs and conditions. An intervention helps the twice-exceptional children to be more adapted, independent, and become valued members of society (Leroux & Levitt-perlman, 2000).

Methodology

Criteria of the Studies in the Review

Research articles were obtained on online database of published articles. Article included in this review were published between 2000 and 2018, and can be either qualitative and/or quantitative studies. A Boolean search is used to combine the keyword to ensure the true concept of review achieved. The keywords used are "gifted with disability", "twice-exceptional", "2e", "gifted", "talented", "intervention", and "learning strategy". After eliminating duplicated articles, 94 articles have been obtained. Then, after the screening process where title and abstract been screened, to ensure the article included the inclusive criteria. Articles with non-intervention are also eliminated.

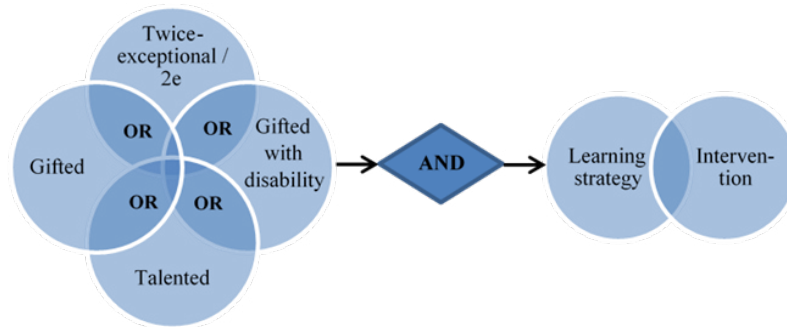


Figure 1: Criteria of the Studies

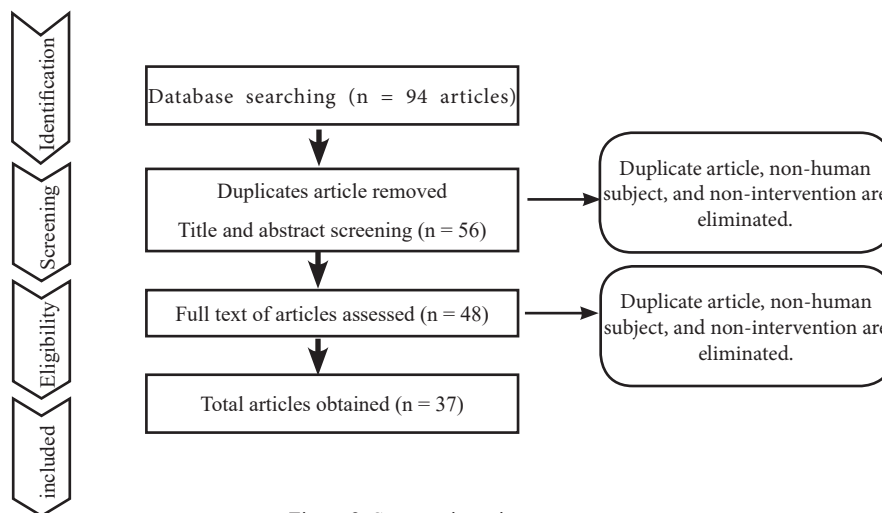


Figure 2: Systematic review process

Participants

All studies are specifically conducted on twice-exceptional (2e) students, which are gifted with any disabilities. The disabilities including Learning Disability (LD), Autism Spectrum Disorder (ASD), Asperger, Attention Deficit Hyperactivity Disorder (ADHD), Cerebral Palsy (CP), Obsessive-Compulsive Disorder (OCD), Emotional and Behavioral Disorder (EBD), hearing impairment, neurological (processing) disability, sensory disability (cortical visual impairment), anxiety, dyslexia and other Specific Learning Disabilities (SLD).

Interventions

To be selected in this review, the article focused on intervention practices or instructions in area of behavioral, developmental, emotional, and/or educational. Moreover, to be included in this review, interventions settings must be practically implemented in educational, clinical, home and/or community. A study must have participants that being identified as having gifted with other exceptionalities such as autism spectrum disorder (ASD), Asperger syndrome, Attention Deficit Hyperactivity Disorder (ADHD), dyslexia, Emotional and Behavioral Disorders (EBD), learning disability, pervasive developmental disorder, and so forth.

Result

Table 1. Continued

Reference	Strategy / Intervention	Result / Main findings	Methodology	Participants
(i) ACADEMIC / LEARNING STRATEGIES				
Boxtel (2016)	Strategy / self checklist in math: R-read problem twice E- Express the problem. (Translate into equation) A-answer S-Share O-Offer explanation N-notice how peer solve it & compare	Student can expressed his reasoning process during problem solving situations.	Qualitative: case study	gifted-ASD
Wang & Neihart (2015b)	Strategies: repetitively reading text, asking questions, and managing time, note-taking and audio-recording of lessons academic engagement: good teaching & caring teacher, parental support, peers influence academic self-efficacy (expectations from others and friends influence in practice of discipline and school rules).	Peers support was the most influenced factor in twice-exceptional s' academic achievement.	Qualitative	6 2e's Singaporean secondary school
Lee & Olenchak (2014)	Individual attention from teacher, shorter assignments with more directions and feedback. Leadership activities provide challenging topics set realistic expectations organizational strategies interactive learning (technology) opportunities to express creativity interact with likeminded peers appreciate their individual differences counseling and social skills training.	The interventions suggested are broad strategies, not focused on gifted-ADHD (can be applied to all types of students).	Review article	gifted-ADHD
Crepeau-Hobson & Blanco (2013)	Small-group counseling, response to intervention (RTI) model, behavioral/ social-emotional intervention, creative graphic organizers.	Improved participant's academic skills, but still struggles with boredom due to not being challenged in his areas of gifted.	Qualitative: case study	gifted-LD

Table 1. Continued

Reference	Strategy / Intervention	Result / Main findings	Methodology	Participants
Willard-Holt et al. (2013)	Learning strategies: choices or flexibility in learning, assessment, and rate use reward strategies and use strengths to face weaknesses work together in a group.	Participants perceived that overall school experience fails to assist them in learning their potential. However, they were able to use their strengths to deal with weaknesses.	Mix-method (Qualitative)	16 male (10-23 years). Gifted with ASD, LD, OCD, CP, emotional, hearing impairment, neurological (processing), & sensory disability (cortical visual impairment)
Schultz (2012)	School culture that allows 2e to be in Advanced Placement (AP), student goals and transition plan, test and environmental accommodation, early education impact, mentoring and familiarity with twice-exceptional student, positive experiences of teachers	School culture and early placement decisions affect enrollment in AP and for-college-credit classes for the twice-exceptional student.	Qualitative	6 college student of twice-exceptional students in Advanced Placement (AP)
Assouline & Whiteman (2011)	Academic acceleration / advance academic work, comprehensive evaluation of student characteristic, assessment, psychoeducational reports must include information about giftedness as well as the disability.	Improved understanding of twice-exceptionality will enhance their unique role in assessing twice-exceptional students and in recommending appropriate interventions in schools	Qualitative - case study	3 students. gifted with ADHD, gifted with ASD, gifted with SLD
Kuo, Su & Maker (2011)	Problem solving strategy, group student based on similar talents and interests.	Students gained significantly higher scores on closed problems, and lower scores on open-ended ones in the Multiple Intelligence class.	Quantitative	61 students (aged 4-6 years) 2e: (ASD, LD, Asperger, hearing or visual impairment)
Yssel et al. (2010)	Group study among twice-exceptional students, project-based & structured, small activities, form large projects, creating secondary and tertiary activities in learning (retaining student focus).	Parents' perception on child's learning and socio-emotional: children are not getting recovery and strengthening strength of child neglected, because focused on child's weakness difficult to handle child's socio-emotional problems.	Qualitative	gifted-LD

Table 1. Continued

Reference	Strategy / Intervention	Result / Main findings	Methodology	Participants
Hannah & Shore (2008)	Increasing student's comprehension in reading.	Metacognitive skills of secondary students are better due to understanding the verse they read. However, lower secondary students are more confident with existing knowledge (reject new information read) than secondary students.	Qualitative	13 male gifted-LD students
Mann R.L. (2006)	Effective teaching practices to students of gifted (spatial) - verbal weaknesses: attitude of caring teachers, learning based on students strength, student-centered learning.	Successfully reduced LD's weaknesses and improved learning achievement.	Qualitative	LD with gifted (spatial strength)
Weinfeld et al. (2005)	Instruction in the student's area of strength and weakness, differentiated program (individualized instructional adaptations and accommodations), comprehensive case, management to coordinate all aspects of the student's individual educational plan, appropriate training and making important resources available.	Successfully handling complicated GLDs: by providing facilities and adaptation to GLD students.	Review article	gifted-LD
Yssel et al. (2005)	Camping program: gifted programming (enrichment), social and emotional skill development, and organizational skills.	Student achievement increased in science and math. Students are highly motivated to learn topics they interested. But, poor academic self-concept (afraid to fail and not a risk-taker), and difficult to make self-expression.	Qualitative	12 gifted-LD secondary school students
Winebrenner (2003)	Teach to appreciate their individual differences (build self-esteem), teaching the larger concepts first, then the details teaching organizational strategies, set realistic expectations for themselves.	Compaction and differentiation opportunities must be offered to twice-exceptional students.	Review article	gifted-LD
Nielsen (2002)	Continuum of alternative service options, access to gifted curriculum, access to technology, counseling, curricular interventions (social and emotional strategies, enhancing giftedness, compensation strategies in academic areas & behavior management).	Recommendations were provided to educators to develop programs and strategies to help students access their giftedness while compensate their disabilities.	Review article	gifted-LD

Table 1. Continued

Reference	Strategy / Intervention	Result / Main findings	Methodology	Participants
Baum et al. (2001)	Solve problems creatively, highlight abilities, maximize potential, focus on strength.	A dually differentiated curriculum of Project HIGH HOPES, helped 2e's student compensate for problematic weaknesses by applying basic skills creatively to an authentic problem.	Review article	gifted-LD
Zental et al. (2001)	Shorter assignments with detail directions, checkpoints and feedback, simplify, breakdown, or categorize assignments, projects, materials, and ideas, include elements of play.	Teaching how to simplify, breakdown, or categorize assignments, projects, materials, and ideas, and then providing checkpoints along the way would be more effective.	Qualitative - case study	9 boys (8-10 years) ADHD, gifted, gifted with ADHD
Leroux & Levitt-Perlman (2000)	Varied instructional interventions, emotional and social support, and collaboration between educators and parents.	Effectiveness of intervention according to twice exceptional strengths and weaknesses.	Qualitative - case study	1 boy of gifted-ADHD (8 - 9 years)
Reis et al. (2000)	Study strategy, parental support, compensation support, counseling, self-perceived strength.	Perspective of successful twice-exceptional students towards an academic learning experience: compensation strategy was effective all participants experience a negative experience during schooling (teachers assume they are lazy, focus on weaknesses, follow LD programs that are not organized and suit them)	Qualitative	12 university students of gifted with SLD
(ii) STRENGTH / TALENT - BASED				
Baldwin (2015)	Strengths and Interests, Accommodations and Modifications, Learning Needs, Social-Emotional Needs, Support.	Recognizing characteristic, strengths and weaknesses facilitated teachers to deliver an appropriate services, and specific strategies to support students' needs across the spectrum.	Qualitative - case study	3 students gifted with ASD / emotional / behavioral problem
Wang & Neihart (2015a)	Develop interests in academic domains, create experiences of success, parental and teacher support, positive peer influence.	Academic concepts and efficacy has been achieved and led to academic success.	Qualitative- Interpretative Phenomenon-logical Analysis (IPA)	6 2e's Singaporean secondary school

Table 1. Continued

Reference	Strategy / Intervention	Result / Main findings	Methodology	Participants
Baum et al. (2014)	(a) psychologically safe environment (b) extra time (without rushing) (c) tolerance for asynchronous behaviors (d) positive relationships (e) strengths-based, talent-focused environment	Potential development program helps to overcome social, emotional and cognitive challenges.	Qualitative - case study	10 students (8 male, 2 female 2e: GAD/ OCD/ Asperger/ anxiety/ ASD/ ADHD
Hua et al. (2012)	Focus to develop the talent of 2e (rather than improve deficits) 1. Inquiry-based learning 2. Negotiation better than accommodation	Help 2e's students to understand their identity, obstructs the underachievement, opportunity to involve and contribute in community.	Qualitative- semi- autobiographical narrative	gifted-ADHD
Foley Niepon et al. (2011)	Focus on ability, opportunity to explore their strengths and receive support in their own needs / weaknesses.	Academic learning improved by using self-strength (creativity, problem solving skills, and analysis capabilities)	Review article	gifted-LD, gifted-ADHD, gifted-ASD
Newman et al. (2009)	The Museum projects (based on Leonardo Da Vinci works): play and grow into art, architecture, engineering and science (Japanese toys and technology, rubber-band powered cars, aero modeling, and boat building).	Participant's self-efficacy increased and organizational skills improved. However, students did not show significant improvement in academic skills.	Quantitative	visual spatial gifted-LD
Mann R.L. (2006)	Effective teaching practices to students of gifted (spatial) - verbal weaknesses: attitude of caring teachers, learning based on students strength, student-centered learning.	Successfully reduced LD's weaknesses and improved learning achievement.	Qualitative	LD with gifted (spatial strength)
Weinfeld et al. (2005)	Instruction in the student's area of strength and weakness, differentiated program (individualized instructional adaptations and accommodations), comprehensive case, management to coordinate all aspects of the student's individual educational plan, appropriate training and making important resources available.	Successfully handling complicated GLDs: by providing facilities and adaptation to GLD students.	Review article	gifted-LD
(iii) SUPPORT / COUNSELING				
Park et al. (2018)	Parents involvement in children's education, advocate for their children, diverse enrichment activities, switched to school with specific learning needs, constantly educated themselves and whole family.	Asian-American parents have a strong parenting style and the pursuit of continuous advocacy in addressing the complexities of 2e children.	Qualitative	10 Asian-American twice-exceptional parents

Table 1. Continued

Reference	Strategy / Intervention	Result / Main findings	Methodology	Participants
Baldwin (2015)	Strengths and Interests, Accommodations and Modifications, Learning Needs, Social-Emotional Needs, Support.	Recognizing characteristic, strengths and weaknesses facilitated teachers to deliver an appropriate services, and specific strategies to support students' needs across the spectrum.	Qualitative - case study	3 students gifted with ASD/ emotional/ behavioral problem
Wang & Neihart (2015a)	Develop interests in academic domains, create experiences of success, parental and teacher support, positive peer influence.	Academic concepts and efficacy has been achieved and led to academic success.	Qualitative- Interpretative Phenomenon-logical Analysis (IPA)	6 2e's Singaporean secondary school
Wang & Neihart (2015b)	Strategies: repetitively reading text, asking questions, and managing time, note-taking and audio-recording of lessons academic engagement: good teaching & caring teacher, parental support, peers influence, academic self-efficacy.	Peers support was the most influenced factor in twice-exceptional s' academic achievement.	Qualitative	6 2e's Singaporean secondary school
Lo & Yuen (2015)	Coping strategies: trial and error method, positive influence, family/parental support, matching talents to opportunities.	Negative experience on their path to learning. However, opportunity and positive influence have motivate them (to ignore criticisms and labeling) and create good achievement.	Qualitative: case study	3 university students, gifted with SLD
Neumeister et al. (2013)	Recognition (gift & disability), Providing and seeking support despite cost/inconvenience, Framing child's beliefs and expectations: normalizing disability, Maintaining high expectations.	Caregiver / parents belief they play an important role in their children's academic success by recognizing the advantages and disadvantages of the children, and the responsibility for the development of their potential children.	Qualitative - grounded theory	10 twice-exceptional individuals that successfully graduated or working.
Foley Niepon et al. (2011)	Focus on ability, opportunity to explore their strengths and receive support in their own needs / weaknesses	academic learning improved by using self-strength (creativity, problem solving skills, and analysis capabilities)	Review article	gifted-LD, gifted-ADHD, gifted-ASD
Olenchak (2009)	Counseling based in 5 Talents Unlimited aspects: productive thinking, communication, future expectations, decision making, planning.	Positive impact on attitudes, self-concepts and creativity of twice-exceptional students.	Mix method (Quantitative)	gifted with LD 57 students

Table 1. Continued

Reference	Strategy / Intervention	Result / Main findings	Methodology	Participants
O'Brien & Giovacco-Johnson (2007)	Trust (parent know their child best), believe in child's potential and strengths-focus, involve inclusively (social skill), participation in extracurricular activities (develop motor skills & self-concept).	Recognize each part of unique children's development, their strengths and weaknesses, as gifts. Positive belief creates hope and confidence to success.	Qualitative: case study	intellectually gifted with learning disability
Thomas & Ray (2006)	3 models of counseling: Belin-Blank Center Model, Structural-Strategic Model, Imaginative-Postmodern Model.	Family pressure reduce, help to express feeling within twice-exceptional family, parents begin to support twice-exceptional children, help creating solutions / modifications according to interests and potential of children.	Qualitative	twice-exceptional student
King (2005)	Self-understanding and self acceptance, continuous support, coping strategies when frustrated, group counseling, social relationship, parent understanding and emphasize child's potential, career planning, and mentorship.	Students must be encouraged to recognize their own strengths and limitations to prepare for future.	Review article	gifted with LD
Kennedy, Higgins & Pierce (2002)	Understand program goals and create students profile, building trust, communication and information, sharing, modifying instruction, evaluation.	Collaborative relationship helps teacher to plan, solve problem and design instructions that meets the academic and emotional needs of twice-exceptional students.	Review article	general and special educators and teachers of gifted students.
Reis et al. (2000)	Study strategy, parental support, compensation support, counseling, self-perceived strength.	Perspective of successful twice-exceptional students towards an academic learning experience: compensation strategy was effective negative experience during schooling (teachers assume they are lazy, focus on weaknesses, LD programs not organized and suit them).	Qualitative	12 university students of gifted with SLD

(iv) ART/ MUSIC

Table 1. Continued

Reference	Strategy / Intervention	Result / Main findings	Methodology	Participants
Nelson & Hourigan (2015)	Multisensory teaching, isolating musical components, learning of jazz and popular music, using technology, small group instruction.	Including multisensory techniques to music instruction, help dyslexia students in reading text and music, and increases self-confidence.	Qualitative	5 professional music, gifted-dyslexia
Abramo (2015)	(a) Highlight strengths and mitigate challenge, (b) emphasize integrative thinking and deemphasize dispersive thinking, flexibility of choice, teach organizational skills, (c) self-regulation and compensation strategies, building relationships.	Multisensory approach is ideal to 2e student.	Paper concept	gifted with disability
(v) TECHNOLOGY				
Sullivans et al. (2017)	Minecraft game: freedom and variety, simulated and real-world problems, adaptable environment that pleasing to students.	Minecraft allow teachers to easily implemented learning environments for twice-exceptional students (based on their challenges).	Developing / designing	no participant
Gunter & Kenny (2012)	Improve student motivation, use of technology / media.	Successfully motivated students to read and improved their understanding in reading.	Quantitative	48 (16 male , 32 female) gifted with reading difficulty

Table 2. Number of studies based on intervention strategy

Intervention Strategy	Studies
Academic/ learning strategies	19
Strength / talent-based	8
Support	13
Art/music	2
Technology	2
Total	44

Table 3. Participants

Reference	Participants
Leroux & Levitt-Perlman (2000)	1 boy of gifted with ADHD (age 8 - 9 years)
Reis et al. (2000)	12 university students of gifted with SLD
Baum et al. (2001)	gifted with LD
Zental et al. (2001)	9 boys (age 8-10 years):ADHD, gifted, gifted with ADHD
Nielsen (2002)	gifted with LD
Kennedy, Higgins & Pierce (2002)	general educators, special educators, and teachers of gifted students
Winebrenner (2003)	gifted with LD
Yssel et al. (2005)	12 secondary school of gifted with LD
Weinfeld et al. (2005)	gifted with LD
King (2005)	gifted with LD
Mann (2006)	gifted (spatial strength) with LD
Thomas & Ray (2006)	twice-exceptional student
O'brien & Giovacco-Johnson (2007)	intellectually gifted with learning disability
Hannah & Shore (2008)	13 male gifted with LD students
Newman et al. (2009)	visual spatial gifted with LD
Olenchak (2009)	57 students : gifted with LD
Yssel et al. (2010)	gifted with LD
Kuo, Su & Maker (2011)	61 students (age 4-6 years): gifted with ASD/ Asperger/ hearing impairment/ visual impairment/ LD
Foley Niepon et al. (2011)	3 students: gifted with LD / ADHD / ASD
Assouline & Whiteman (2011)	3 students: gifted with ADHD, gifted with ASD, gifted with SLD
Schultz (2012)	6 college of twice-exceptional students in Advanced Placement (AP)
Hua et al. (2012)	gifted with ADHD
Gunter & Kenny (2012)	48 (16 male, 32 female): gifted with reading difficulty
Willard-Holt et al. (2013)	16 male (age 10-23 years): gifted with ASD/ LD/ OCD/ emotional/ CP/ hearing impairment/ neurological (processing)/ sensory disability (cortical visual impairment)
Crepeau-Hobson & Blanco (2013)	gifted with LD
Neumeister et al. (2013)	10 twice-exceptional individuals that successfully graduated or working.
Lee & Olenchak (2014)	gifted with ADHD
Baum et al. (2014)	10 students (8 male, 2 female) : gifted with GAD/ Asperger/ anxiety/ ADHD/ OCD/ ASD
Baldwin (2015)	3students: gifted with ASD/ emotional/ behavioral problem
Wang & Neihart (2015a)	6 twice-exceptional Singaporean secondary school
Wang & Neihart (2015b)	6 twice-exceptional Singaporean secondary school
Nelson & Hourigan (2015)	5 professional music: gifted with dyslexia
Abramo (2015)	gifted with LD
Boxtel (2016)	gifted with ASD
Lo & Yuen (2015)	3 university students: gifted with SLD
Sullivans et al. (2017)	no participant
Park et al. (2018)	10 Asian-American twice-exceptional parents

Discussion

Participants

All studies conducted are focused on twice-exceptional students, which are gifted with particular disabilities. Majority participants of the studies are having Learning Disability (LD), while the others are having Autism Spectrum Disorder (ASD), Asperger, Attention Deficit Hyperactivity Disorder (ADHD), Cerebral Palsy (CP), Obsessive-Compulsive Disorder (OCD), emotional and behavioral disorder, hearing impairment, neurological (processing) disability, sensory disability (cortical visual impairment), anxiety, dyslexia and other Specific Learning Disabilities (SLD) that not being mentioned specifically (see Table 3). Besides that, age of participants were diverse between the age of 4 and 23 years, where the participants were including pre-school students, primary and secondary students, college or university students, as well as twice-exceptional individuals who were graduated or employed. Nevertheless, few studies did not mentioned detail of participants specifically. Furthermore, study of Sullivan, Robb, Howell, Marshall, and Goodman, (2017) did not involve any participants directly as their study was developing or designing method. Sullivan et al. (2017) developed mine craft video game to allow teachers to easily implemented learning environments for twice-exceptional students based on their challenges.

Intervention Strategy

Based on the findings of all the studies, author categorized the intervention strategies into five main themes, which are academic or learning strategy, strength or talent-based strategy, support, art or music, and technology. Not all interventions recommended are suitable for all type of twice-exceptional children. Thus, treatment matching is crucial. Therefore, effective interventions must tailor to the unique strengths and needs of the twice-exceptional individual. Besides that, there are few studies

were categorized into more than one theme, since multiple interventions were used.

Theme 1: Academic / learning strategies

A number of studies present recommended academic or learning strategies for twice-exceptional learners. Assouline and Whiteman (2011) and Schultz (2012) proposed that academic acceleration or Advanced Placement (AP) should be considered for the twice-exceptional students with additional behavioral and emotional interventions. These recommendations reinforce the suggestion of Nielsen (2002) to give an opportunity for twice-exceptional student to access to gifted curriculum and their right to sit in gifted programming or advanced academic work should not be denied (Assouline & Whiteman, 2011; Yssel, Margison, Cross, & Merbler, 2005).

Besides that, Leroux and Levitt-perlman (2000) and Weinfeld, Barnes-robinson, Jeweler, and Shevltz (2005) highlighted the importance of differentiated program and varied instructional interventions according to student's area of strength and weakness. Furthermore, an organizational skill also has been emphasized by some researchers as it help to motivate and improve student academic performance (Crepeau-hobson & Bianco, 2013; Lee & Olenchak, 2014; Winebrenner, 2003; Yssel et al., 2005; Yssel, Prater, & Smith, 2010). In addition, Yssel et al. (2010) recommends the learning should be project-based and structured. They are also encouraged to make small activities, then forming large project. In contrast, Winebrenner (2003) recommends teaching the larger concepts first, then the details. Meanwhile, finding indicated that twice-exceptional students were easier to learn from shorter assignments with detail directions, simplify and breakdown technique, categorize tasks, projects, materials, and ideas, provide checkpoints and getting feedback (Zentall, Moon, Hall, & Grskovic, 2001).

Other academic and learning interventions

strategies used by researchers are increase student's comprehension in reading (Hannah & Shore, 2008), set student goals and transition plan, and set realistic expectations (Lee & Olenchak, 2014; Winebrenner, 2003), self-checklist in solving mathematic (Boxtel, 2016), problem solving strategy (Kuo, Su, & Maker, 2011), leadership activities (Lee & Olenchak, 2014), express creativity in learning (Baum, Cooper, & Neu, 2001; Lee & Olenchak, 2014), providing challenging topics (Zentall et al., 2001) student-centered learning (Mann, 2006), and group activities (Kuo et al., 2011; Yssel et al., 2010). Grouping the students based on similar interests and strengths in learning session, increased self-confidence and help students to gained significantly higher academic achievement.

Theme 2: Strength / talent – based

Most researchers also emphasize the use of strength or talents-based to support the twice-exceptional learners. In fact, strength-based approach is proven successful in developing a positive mindset, healthy self-esteem, strong self-efficacy and higher academic achievement in twice exceptional students (Baldwin et al., 2015; Newman et al., 2009; Wang & Neihart, 2015a). Therefore, it is efficient to view them as being gifted first, and see their disability as secondary. First and foremost, the children must understand their identity and recognized their own strengths and weaknesses. (Hua et al., 2012). So that, the twice-exceptional children will appreciate their individual differences, build self-esteem and self acceptance (King, 2005; Lee & Olenchak, 2014; Winebrenner, 2003). Teachers are encouraged to frame the child's belief and expectations to overcome their disability (Neumeister, Yssel, & Burney, 2013).

Educators have to maximize their potentials, explore their strength and interest, strengthen their abilities, and appreciate their uniqueness in teaching practices (Baldwin et al., 2015; Baum et al., 2001; Hua et al., 2012; Lee & Olenchak, 2014; Mann, 2006; Nicpon et al.,

2011). Several technique used were develop interests in academic domains and create experience of success (Wang & Neihart, 2015a), use inquiry-based learning (Hua et al., 2012), create talent-focused environment with suitable accommodations and modifications (Baldwin et al., 2015; Baum, Schader, & Hébert, 2014), provide extra time to allow changes without rushing or demanding (Baum et al., 2014), matching talents to opportunities (Lo & Yuen, 2015) and give instruction in the student's area of strength and weaknesses (Weinfeld et al., 2005). Overall studies found that emphasizing strength-based strategies has improved learning achievement, increased self-efficacy, and help to overcome social and emotional challenges. Indeed, focus on student's strengths giving them an opportunity to thrive and be successful in any way they are good at.

Theme 3: Support

Having lack of social skills, social isolation, low self-esteem are the personality traits of twice-exceptional children. Thus, few researchers focused on support interventions in order to overcome it. Strong parenting style with continuous parental support help growing children's potential, improved self-efficacy and overcome their weaknesses (Lo & Yuen, 2015; Neumeister et al., 2013; Park, Nicpon, Choate, & Bolenbaugh, 2018; Reis, Mcguire, & Neu, 2000; Wang & Neihart, 2015a, 2015b). Furthermore, Park, Nicpon, Choate, and Bolenbaugh (2018) found that strong parenting style rouse them to find and switch their children to school with specifics learning needs, involve in their children's education, involved in diverse enrichment activities, providing and seeking support despite cost or inconvenience, trust and believe in child's potential, constantly educate whole family and continuously advocate others about their children's complexities (King, 2005; Neumeister et al., 2013; O'brien & Giovacco-johnson, 2007; Park et al., 2018) .

Besides that, understanding and caring teachers with good teaching practices

influence the academic engagement of twice-exceptional students (Wang & Neihart, 2015b). Comprehensive counseling program for gifted with disability offered good results in students social skills, self-efficacy and attitudes (Nicpon et al., 2011; Olenchak, 2009), create positive belief that build hope and confidence to success (O'Brien & Giovacco-johnson, 2007), reduced family pressure and provide opportunities to express feeling within twice-exceptional family (Thomas & Ray, 2006), recognize children's strengths and limitation, and help creating solutions or modifications (King, 2005; Thomas & Ray, 2006), abolish children's negative experience during schooling (Lo & Yuen, 2015; Reis et al., 2000), and make a career plan and future expectations to encourage them to prepare for future (King, 2005; Olenchak, 2009).

In addition, positive influence and peer support help them ignore criticisms and labeling (Lo & Yuen, 2015) and it became the main contribution in twice-exceptional s' academic achievement (Wang & Neihart, 2015b). Support for the unique social and emotional needs of twice-exceptional students was very challenging to the educators. Therefore, teacher must be trained to understand the characteristics and needs of gifted students with learning disabilities, as well as strategies to facilitate their learning, set realistic expectations, and support students' needs across the spectrum (Baldwin et al., 2015; Neumeister et al., 2013). Besides, educators are encourage to collaborate their knowledge, skills, and support of other educators or professionals in the schools (Kennedy, Higgins, & Pierce, 2002).

Theme 4: Technology

A dynamic, real-time response, enjoyable and engaging environments has made technology become an effective strategy in learning (Gunter & Kenny, 2012). Moreover, by used of technology, a concept of static pictures in book can be visualized. Learning in technology environment provide modifications and accommodations to their learning content and

environment, allow students to explore areas of particular interest in greater depth, developed experimental learning, has opportunity to express their creativity and critical thinking, motivated them in learning, increased self-confidence and independence (Gunter & Kenny, 2012; Sullivan et al., 2017).

A tremendous variety of assistive technology is available today, providing the opportunity for gifted with disability students to access information technology, enhances learning, and performs daily living for students with disabilities. However, study of technology intervention that focused on twice-exceptional students is still limited.

Theme 5: Art /music

Intervention in art and music emphasized the multisensory approaches that highlight an integrative thinking and deemphasize dispersive thinking, provide flexibility based on their potentials and strengths, motivate them, sharpen their creativity, increase self-efficacy, improved organizational skills and grow the strengths and mitigate challenges (Abramo, 2015; Nelson & Hourigan, 2015). Nonetheless, there are still limited researches on music intervention specifically on gifted with disabilities student.

Conclusion

The current review identifies focused intervention practices for twice-exceptional students. Teachers must develop a plan to provide modifications and accommodations to their learning content and environment based on student's strengths and potentials as well as provides remediation and support for their social and emotional needs. Celebrate student's differences with positive influences and continuous support, and using effective instructional approaches, help twice-exceptional learners to overcome their academic difficulties, social and behavioral challenges and provide an opportunity for them to thrive and be successful in satisfying careers and lives. Furthermore,

educators are encouraged to collaborate with other educators, parents, professionals, and therapists to share knowledge, experiences, and skills in creating solutions or modifications according to strengths and needs of twice-exceptional children.

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