

# Infiniti Cergas Sihat (Inces) as an Innovation in Teaching and Learning for Special Education Students

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## Abstract

Innovation in teaching and learning (TL) aims to improve the effectiveness of the delivery of knowledge. The impact of effective innovation is a teaching method that looks more interesting with higher acceptance among students. *Infiniti Cergas Sihat* (InCeS) is a teaching aid that contributes to the development of current TL innovation. Attractive color design and interactive method of playing make this innovation easy for students to accept. This study aims to see the effectiveness of InCeS on TL for students and the focus of this study is on special needs students. A total of 40 special needs students from a school in Pulau Pinang have participated in the program involving the InCeS application in TL. Results from the questionnaire given to the teachers involved during the activities show that the students showed interest in the activities that used InCeS. The teacher's participation in the activity also contributes to the interaction in learning for the special needs students.

**Keywords:** Teaching Aid, Innovation, Special Need Students, Teaching and Learning; Interactive

## Introduction

Uncontrolled use of modern technology such as playing virtual games has a negative impact on the health of the game. Virtual game players often face health problems such as short-sightedness, obesity, and irregular sleep problems (Mail & Ibharim, 2020). In addition, they also often experience emotional disturbances and lack communication skills (Pushpunathan & Pitchan, 2019). Physical and muscle development is also affected because of playing virtual games for a long period of time (Nahar et al., 2017). In order to overcome and balance the uncontrolled use of modern technology, a board game called *Infiniti Cergas Sihat* (InCeS) was developed. Physical activity and exercise can improve self-image, social skills and cognitive function and reduce symptoms of anxiety (Taylor et al., 1985).

InCeS combines face-to-face physical and intellectual activities in groups. InCeS was developed inspired by the findings of previous research studies that stated that board games

can increase understanding of knowledge, increase interpersonal interaction between participants, increase motivation and counting skills of participants (Noda et al., 2019; Elofsson et al., 2016). Therefore, this paper will discuss the implications of using InCeS to 40 special education students from a school in Penang. After playing the InCeS board game, students with the help of the accompanying teacher are required to answer a questionnaire to study the implications of this game for them.

### **Literature Review**

Various studies related to the benefits of board games have been conducted by many researchers from around the world. Among them, a study conducted by Nakao (2019), states that board games are beneficial in modifying human behavior. Other findings include the effects of board games on brain function, cognitive effects, and modification of lifestyle and health factors. According to Lin (2017), board games experienced development starting in 2001. This development is due to the insistence of the players by making board games an option during leisure activities. Student involvement in board games can help their intellectual development. Board games that have the characteristics of playing while learning have the potential to be produced and expand their market since these games can make students happy and help in improving their knowledge (Coil et al., 2017).

Researchers also believe that with the help of board games, interpersonal communication of most people with different backgrounds can be applied (Wu, 2011). The mechanics of the game, the choice of playing partners and the frequency of play affect the effect of the board game. Wu (2011) also suggested that board games be used as teaching materials to train various player abilities. The use of board games is an inexpensive method to reduce the knowledge gap that separates less able and more able children when they want to start school (Siegler & Ramani, 2009). Board games are a simple low-cost intervention that can successfully improve the numerical skills of children from low-income families (Scalise et al., 2019).

Mou et al (2018), in their paper stated that most children are interested and happy to play the board game they created because it works as a game while doing physical activity. While Estrada-Plana et al (2021), also concluded that modern board games and cards can be an effective cognitive intervention to maintain some cognitive functions.

The results of a study by Davis-Temple et al (2014), to students with special needs showed that teaching the steps of a board game using a simple procedure led to an improvement in their performance in completing game tasks. The child with special needs also enjoys the game and can mention certain aspects of the game. In addition, class teachers reported that the intervention was very helpful in teaching children to play games.

### **Methodology**

#### **a) Respondents**

The research conducted is based on the observation method, using a safe sampling method which considers all special education students participating in the Science, Technology, Engineering and Mathematics or STEM (Science, technology, engineering, and mathematics) program, a joint venture between a school in Penang and UiTM Pulau Pinang. A total of forty students attended and participated in the two-day activities.

In the program, InCeS has been used as one of the activities. InCes is a board game that is used as an intermediate medium for teaching while playing or Game-Based Teaching (PBP). In addition, InCeS also implements exercise activities as an intermediary game instrument to

promote healthy physical activity. This is because based on a systematic study conducted by Ng et al (2017), concluded that children with ADHD (attention deficit and hyperactivity disorder) and normal children respond better after physical activity.

#### b) Game method InCeS

InCeS is a board game, using infinity and colorful symbols (Figure 1). Each compartment contains a light exercise activity such as sit ups, push ups, planks, jumping jacks, squats, local running and stretching exercises. The infinity symbol allows the game to be played continuously until a certain period set by the player. In addition to exercise activities, this InCeS section also has a penalty section and a reward section to make it more interesting. InCeS games are combined with learning activities such as reading text cards or math operation cards.



Figure 1. Board game set InCeS

The gameplay of InCeS can be explained briefly in the flow chart of Figure 2. It is designed so that it can be played in groups or individually. At the beginning of the game, each representative of the group (if playing in a group) or individual throws dice to determine the turn. The group or individual with the highest dice points will start the game. Players throw the dice and move counter based on the number shown on the dice. Players must answer questions and do exercises. Only correct answers will get marks.

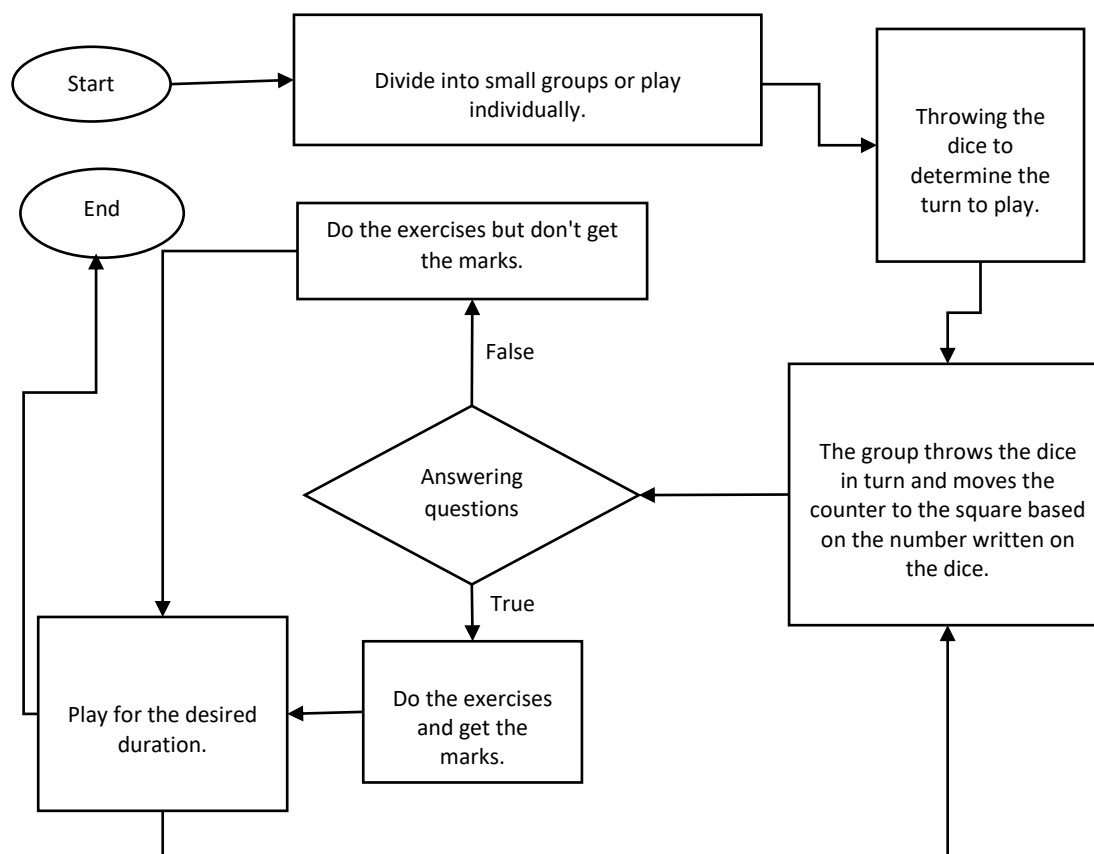


Figure 2. How to operate the InCeS game as an innovated learning tool

### c) Research Instrument

A questionnaire has been developed based on the assessment of JERI (Physical, Emotional, Spiritual and Intellectual) which has been introduced in the National Education Philosophy 2021 as an important criterion in the development of the young generation to produce a balanced generation. According to Adnan (2010), this JERI criteria is important to achieve national education goals to produce outstanding individuals

- (1) **PHYSICAL criteria.** Physical health is closely related to physical activity performed by each individual. A healthy body is an individual who has physical fitness and good personal health. Students who have physical health enable them to carry out effective learning (Edginton et al., 2011). Physical health also contributes to positive changes in student behavior (Mahadi et al., 2015).
- (2) **EMOTIONAL criteria.** Emotions are closely related to individual psychological changes to the situation they face. Sulaiman et al (2017) explained that emotional intelligence can increase the individual's potential. Emotional differences between students' economic levels also affect academic achievement (Sanu, 2019). The emotional element should not be taken lightly because it also involves social skills, emotional management, and the individual's empathy towards others.
- (3) **SPIRITUAL criteria.** This criterion is related to the individual's heart and soul which cannot be seen with the naked eye. Spiritual health is closely related to the application of religious values (Ahmad et al., 2005; Hamzah, 2021). Adherence in religion becomes a guide in encouraging individuals to practice good and commendable morals and

attitudes (Jodi et al., 2014). Therefore, individuals who have a healthy spirituality will be able to contribute to harmony and well-being among the community.

- (4) **INTELLECTUAL criteria.** Intellect is the individual's ability to think and understand, then make an assessment in a process. The mastery of the 3M, which is reading, writing, and calculating faster, can affect the improvement of students' intellect. Intellect is also one of the factors for improving performance in learning (Rayung et al., 2019; Michael & Ambotang, 2019).

The challenges and preparation of teaching and learning for special education students are different and require the cooperation of all parties including parents (Ishak et al., 2012). However, based on the criteria, the assessment should be processed according to the suitability of the special education student (Manap et al., 2020). Another criterion is added to the assessment, **SOCIAL criteria**, to assess students' ability to establish social relationships with friends. Table 1 is a summary of the assessment that has been modified to suit special education students.

Table 1

*Summary of JERI criteria evidence based on InCeS assessment*

CRITERIA	DESCRIPTION
<b>Physically</b>	The ability of students to carry out the directed activities.
<b>Emotions</b>	Students' ability to show emotions (happy, angry, etc.).
<b>Spiritual</b>	Student compliance with the instructions given as well as maintaining morals/attitude while carrying out activities.
<b>Intellectual</b>	Ability of students to motivate themselves and help other friends.
<b>Social</b>	Students' ability to establish social relationships with friends.

### Analysis and Discussion

Forty special education students who participated in this program consisted of 26 male students (65%) and 14 female students (35%) referred to Figure 3. They range in age from 13 to 19 years old. Eleven of them are 16 years old, eight people are 17 years old, seven people are 13 years old, five people are 15 years old while the rest are 14 years old (three students), 18 years old (three students) and 19 years old (three students). This student has attended school at this school between nine months and six years. However, only half of the data on the duration of schooling at the school was obtained. Apart from that, the learning level of these students is not determined by their age, but their ability to be independent and follow the skills learning process at school.

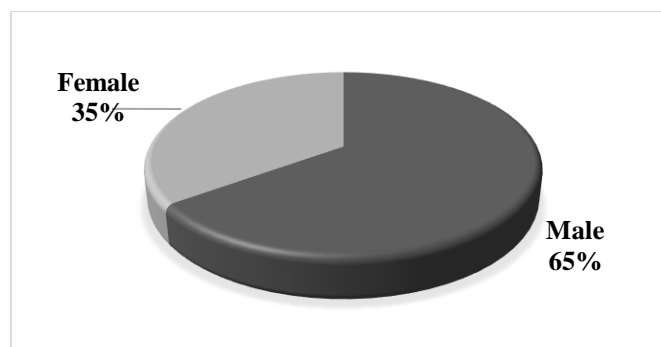


Figure 3. Students involved by gender

Referring to Figure 4, from the assessment done by the teacher, 85% of students are very physically active. 75% of students showed mixed emotions such as being happy when they answered the answer correctly, excited to help their friends and disappointed when they failed to answer correctly. However, there were two students who did not show any emotion while playing. This coincides with the results of the study (Gapin & Etnier, 2014) showing that physical activities such as sports are generally considered effective in reducing the symptoms of uncontrollable behavior among children diagnosed with ADHD. These findings add support to the underlying mechanism-based argument that sports activity may be an appropriate strategy to reduce serious ADHD symptoms.

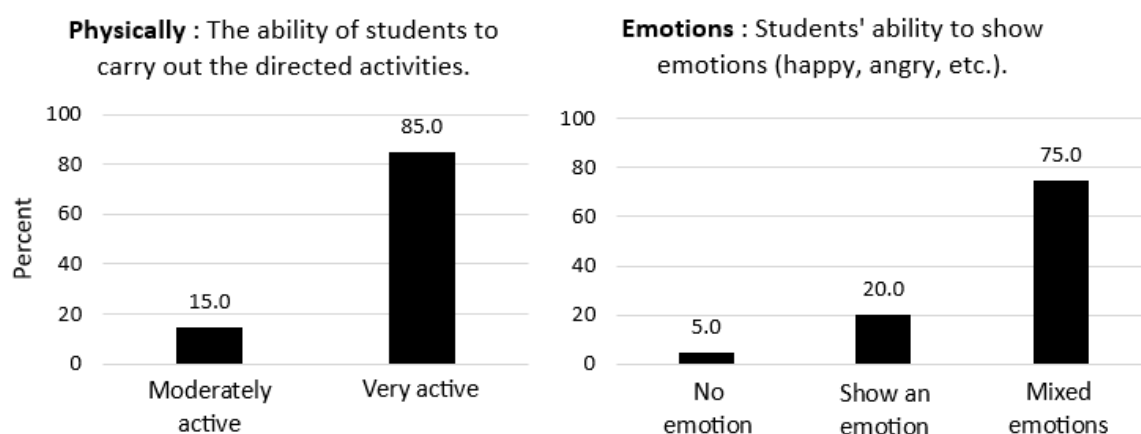


Figure 4. Teacher evaluation of students based on physical and emotional criteria

Figure 5 is based on compliance with the rules of the game, 90% of students understand and obey the instructions of the game. While the rest could not fully follow the instructions given. Intellectually, 57.5% are actively involved by giving support and encouragement to all friends. While other than that, only choose certain friends to be supported. On the social side, 70% of students can communicate with all students while 30% only communicate with certain individuals. However, this situation is very helpful in developing the social skills of special education students. This is supported by the study of Sung and Hwang (2013), namely PBP is a learning environment that integrates games and facilitates students to collaborate with each other and organize the knowledge learned during the learning process.

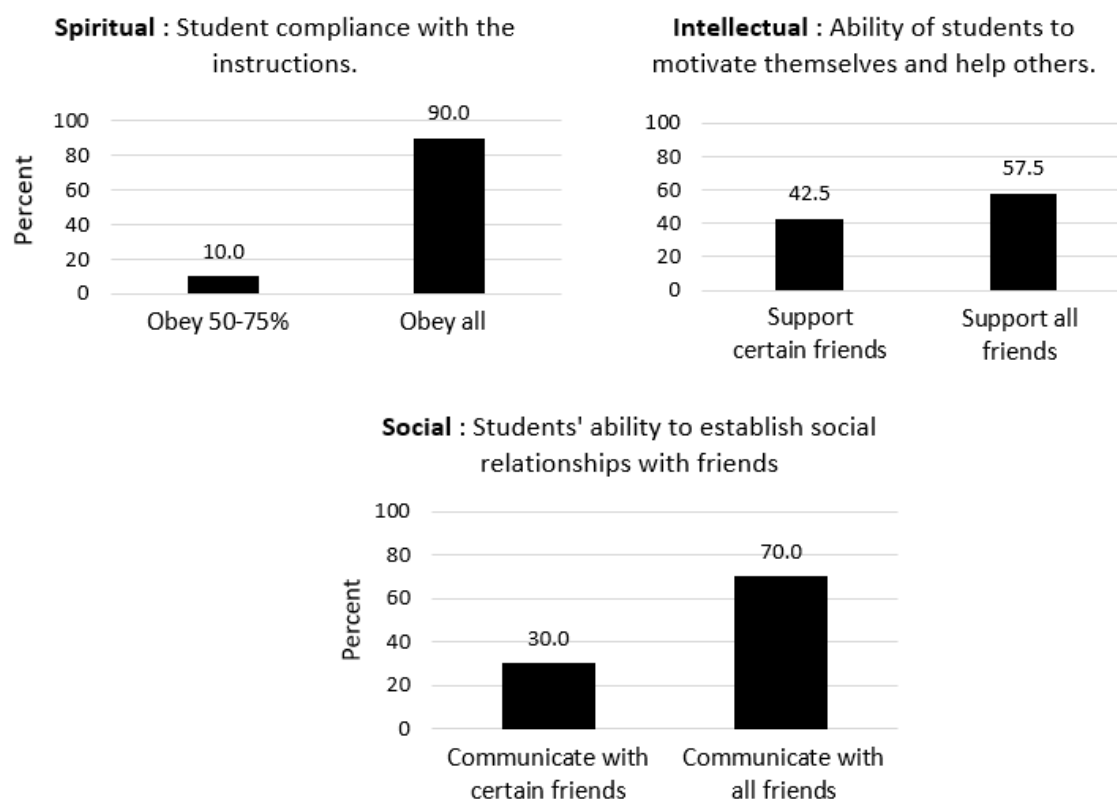


Figure 5. Teachers' evaluation of students based on spiritual, intellectual, and social criteria

### Conclusion

Special needs students should be given different and more planned attention. Specifically teaching aids that can interest them in the teaching and learning process (Yasin et al., 2013). Therefore, InCeS is an interesting board game that can be used in TL. InCeS can attract students to try this game because it has its own appeal in terms of design and color. InCeS is suitable to use in schools as a teaching aid in assessing emotional, intellect, and fitness of students. According to a study (Khalil et al., 2020), teachers should give immense efforts to carry out an effective TL to special needs students. Teachers have also been directly involved in the activities carried out, making the teaching and learning process more interesting and effective. From the findings, it can be concluded that the teachers and students are exceptionally interested and enjoyed using InCeS in their TL practice.

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## References

- Adnan, M. F. B., Hamzah, R. B., & Udin, A. B. (2011). Implikasi Falsafah Pendidikan Kebangsaan dalam Pendidikan Teknik dan Vokasional di Malaysia. Universiti Teknologi Malaysia.
- Ahmad, R., Mustaffa, M. S., & Ramli, J. (2005). *Kesihatan Mental Rakyat Malaysia Masa Kini Suatu Pendekatan Kaunseling Berdasarkan Nilai-Nilai Islam*. Universiti Teknologi Malaysia, Skudai.
- Coil, D. A., Ettinger, C. L., & Eisen, J. A. (2017). Gut Check: The evolution of an educational board game. *PLOS Biology*, 15(4), e2001984. <https://doi.org/10.1371/journal.pbio.2001984>.
- Davis-Temple, J., Jung, S., & Sainato, D. M. (2014). Teaching Young Children with Special Needs and Their Peers to Play Board Games: Effects of a Least to Most Prompting Procedure to Increase Independent Performance. *Behavior analysis in practice*, 7(1), 21–30. <https://doi.org/10.1007/s40617-014-0001-8>
- Edginton, C. R., Chin, M. K., & Wee, E. H. (2011). Pendidikan kesihatan dan jasmani: satu pernyataan konsensus sejagat baru. *Malaysian Journal of Sport Science and Recreation*, 7(1), 65-81.
- Elofsson, J., Gustafson, S., Samuelsson, J. & Traff, U. (2016). Playing number board games supports 5-year-old children's early mathematical development. *Journal of Mathematical Behavior*, 43, 134-147.
- Estrada-Plana, V., Montanera, R., Ibarz-Estruga, A., March-Llanes, J., Vita-Barrull, N., Guzman, N., Ros-Morente, A., Ayesa Arriola, R., & Moya-Higueras, J. (2021). Cognitive training with modern board and card games in healthy older adults: two randomized controlled trials. *International Journal of Geriatric Psychiatry*, 36(6), 839–850. <https://doi.org/10.1002/gps.5484>
- Hamzah, R. (2021). Kesihatan mental dan kecerdasan spiritual mahasiswa di universiti; satu perbandingan antara tahun pengajian dan agama. *International Journal of Humanities Technology and Civilization*, 18-35.
- Ishak, H., Tamuri, Ab. H. R. A. M., & Bari, S. (2012). Amalan pengajaran guru dalam pengajaran dan pembelajaran pendidikan Islam di sekolah kebangsaan pendidikan khas (masalah pendengaran). *JIAE: Journal of Islamic and Arabic Education*, 2(4), 11-24.
- Jennifer, I. G., Jennifer, L. Etner. (2014). Parental perceptions of the effects of exercise on behavior in children and adolescents with ADHD. *Journal of Sport and Health Science*, 3(4), 320-325, <https://doi.org/10.1016/j.jshs.2013.03.002>.
- Jodi, K. H. M., Mohamad, M. A., & Seman, A. C. (2014). Penerapan agama dalam modul psikospiritual dan kesannya terhadap kesihatan spiritual: Kajian kes di Kompleks Dar Assaadah Kuala Lumpur. *Jurnal Syariah*, 22(1), 107-127.
- Khalil, S. R., Razalli, A. R., & Ismail, M. Z. (2020). Tahap komposisi amalan pengajaran guru pendidikan khas dalam program pendidikan khas integrasi (PPKI): satu tinjauan awal. *Jurnal IPDA*, 26(1), 161-173.
- Yuen, L. (2017). Research on the in-depth leisure of table game participants. *Master's thesis, Institute of Leisure Management, Corning University, Tainan City*. <https://hdl.handle.net/11296/4b6e9d>.
- Mahadi, N. B., Hashim, S. A. B., & Bahrin, K. B. K. (2015). Kajian efikasi guru pendidikan jasmani terhadap kandungan pendidikan pencegahan dadah dalam sukatan mata pelajaran.
- Mail, S. N., & Ibharim, L. F. M. (2020). Pengaruh Sikap Terhadap Pelajar di UPSI Apabila Menggunakan Aplikasi Permainan Atas Talian. *Journal of Humanities and Social Sciences*, 2(3), 82-87.



- Manap, M. H. A., Haron, Z., & Othman, N. (2020). Penilaian pelaksanaan program Pentaksiran Alternatif Sekolah Rendah (PASR) di Sekolah Rendah Pendidikan Khas Integrasi (School Alternative Assessment Programme (PASR) Implementation Evaluation In Special Education Integrated School). *Jurnal Pendidikan Malaysia (Malaysian Journal of Education)*, 45(1S1), 9-16.
- Nasir, M. M., & Ain Hazwani, A. K. (2014). Keberkesanan kaedah belajar sambil main dalam meningkatkan kemahiran membaca lisan dalam kalangan murid-murid bermasalah pembelajaran. *Asian Education Action Research Journal (AEARJ)*, 3.
- Michael, S., & Ambotang, A. S. (2019). Hubungan pengurusan kokurikulum dengan penglibatan pelajar dalam aktiviti kokurikulum sekolah menengah. *Malaysian Journal of Social Sciences and Humanities (MJSSH)*, 4(7), 202-207.
- Mou, T.-Y., Yin, Z.-X., Kao, C.-P., & Lin, H.-H. (2018). Run for fun: Shape body and knowledge through playing. *2018 International Conference on Orange Technologies (ICOT)*. <https://doi.org/10.1109/icot.2018.8705836>
- Nakao, M. (2019). Special series on “effects of board games on health education and promotion” board games as a promising tool for health promotion: a review of recent literature. *BioPsychoSocial Med*, 13, 5. <https://doi.org/10.1186/s13030-019-0146-3>.
- Nahar, N., Sangi, S., Rosli, N., & Abdullah, A. H. (2018). Impak negatif teknologi moden dalam kehidupan dan perkembangan kanak-kanak hingga usia remaja (Negative impact of modern technology to the children’s life and their development). *UMRAN-International Journal of Islamic and Civilizational Studies*, 5(1).
- Ng, Q. X., Ho, C. Y. X., Chan, H. W., Yong, B. Z. J., Yeo, W. A. (2017). Managing childhood and adolescent attention-deficit/hyperactivity disorder (ADHD) with exercise: A systematic review. *Complementary Therapies in Medicine*, 34, Pages 123-128, ISSN 0965-2299, <https://doi.org/10.1016/j.ctim.2017.08.018>.
- Noda, S., Shiotsuki, K., & Nakao, M. (2019). The effectiveness of intervention with board games: a systematic review. *BioPsychoSocial Med*, 13, 22. <https://doi.org/10.1186/s13030-019-0164-1>.
- Pushpunathan, A. R., & Pitchan, M. A. (2019). Permainan Mobile Legends dalam kalangan wanita di Hulu Langat, Selangor: Analisis terhadap faktor dan kesan. *Jurnal Wacana Sarjana*, 3(4), 1 - 11. <http://spaj.ukm.my/jws/index.php/jws/article/view/296>.
- Ramani, G. B., Daubert, E. N., & Scalise, N. R. (2019). Role of play and games in building children’s foundational numerical knowledge. In D. C. Geary, D. B. Berch, & K. M. Koepke (Eds.), *Cognitive foundations for improving mathematical learning* (pp. 69–90). *Elsevier Academic Press*. <https://doi.org/10.1016/B978-0-12-815952-1.00003-7>
- Rayung, M. N., Ambotang, A. S., & Abdullah, M. Y. (2019). Pengaruh kecerdasan holistik terhadap kemenjadian pelajar tingkatan enam di Sabah. *Jurnal Kesidang*, 3(1), 9-22.
- Sanu, M. E., & Rathakrishnan, B. (2019). Strategi daya tindak sebagai mediator dalam hubungan kecerdasan emosi dan kesejahteraan psikologi pelajar miskin di luar bandar Sabah. *Journal of Advanced Research in Social and Behavioural Sciences*, 14(1), 9-15.
- Siegler, R. S., & Ramani, G. B. (2009). Playing linear number board games—but not circular ones—improves low-income preschoolers’ numerical understanding. *Journal of Educational Psychology*, 101(3), 545–560. <https://doi.org/10.1037/a0014239>.
- Sulaiman, H., Tanjung, A. S., Khalid, N. M., Razak, N. A. A., & Salleh, N. H. (2017). Kecerdasan emosi dalam meningkatkan keperibadian remaja. *Juku: Jurnal Kurikulum & Pengajaran Asia Pasifik*, 1(3), 28-33.

- Sung, Han-Y., & Hwang, Gwo-J. (2013). A collaborative game-based learning approach to improving students' learning performance in science courses. *Computers & Education*, 63, 43–51. 10.1016/j.compedu.2012.11.019.
- Taylor, C. B., Sallis, J. F., Needle, R. (1985). The Relation of Physical Activity and Exercise to Mental Health. *Public Health Rep.*; 100:195–202. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1424736/pdf/pubhealthrep00100-0085.pdf>.
- Wu Chenghan. (2011). Research on the improvement of interpersonal communication by the participation pattern of table games-taking customers of table game specialty stores in Taipei as an example. *Master's thesis*, Institute of Sports and Leisure Management, National Taiwan Normal University, Taipei City. <https://hdl.handle.net/11296/jgmhd8>.
- Yasin, M. H. M., Toran, H., Tahar, M. M., Bari, S., Ibrahim, S. N. N., & Zaharudin, R. (2013). Bilik darjah pendidikan khas pada masa kini dan kekangannya terhadap proses pengajaran. *Asia Pacific Journal of Educators and Education*, 28, 1-9.