

# Music as the Means to Stimulate Novelty and Challenge Seeking in Persons with Intellectual Disability

Amanallah Soltani<sup>1\*</sup>, Samsilah Roslan<sup>1</sup>, Maria Chong Abdullah<sup>1</sup>,  
Chan Cheong Jan<sup>2</sup>

1. Faculty of Educational Study, University Putra Malaysia

2. Faculty of Human Ecology, University Putra Malaysia

## ABSTRACT

**Purpose:** *The main aim of the study was to determine whether challenge seeking behaviour could be increased by stimulating persons with intellectual disability with music. The intention was also to evaluate whether the participants would attempt to seek challenges when they felt bored with a music experience.*

**Method:** *Thirty adolescents and young adults with mild to moderate intellectual disability were randomly selected to take part in a repeated-measure experimental design, under three different conditions. In the first condition, the participants were provided adequate challenges through teaching fundamental musical skills. In the second condition, no optimal challenge was provided, and in the third condition, using special strategies, the participants were stimulated to look for novelty and challenge through involvement in creative musical tasks. Level of innovation, as an index of challenge seeking, was measured during the 8 minutes of free choice interval at the end of each condition.*

**Results:** *Using Friedman's ANOVA and Wilcoxon signed-rank test, the findings showed that the low and statistically similar levels of challenge seeking behaviour in conditions 1 and 2 significantly increased to a high level in condition 3. It confirmed that participants with intellectual disability are capable of demonstrating challenge seeking behaviour if they are stimulated to do so. The results also confirmed that the tendency to demonstrate challenge seeking behaviour during a boring musical situation was low.*

**Key words:** *Intellectual disability, challenge seeking behaviour, innovation, music intervention programme*

---

\*Corresponding Author: Dr Amanallah Soltani, Faculty of Educational Study, University Putra Malaysia, Selangor, Malaysia. Email: soltanimani@yahoo.com

## INTRODUCTION

Challenge seeking refers to the intrinsically motivated behaviour that individuals engage in to seek out challenge and novelty for the sake of pleasure, curiosity, and to feel competent (White, 1959). Some well-known motivation theories have highlighted the importance of challenge seeking as energy behind different types of intrinsic motivation. White (1959) in his theory of effectance motivation laid emphasis on challenge seeking as an inherent psychological need which stimulates a person to interact with the environment effectively to feel pleasure and competency. Csikszentmihalyi (1975) in his theory of flow experience introduced flow as an unstable status which stimulates a person involved in an activity to seek-out optimal challenge as his or her skills level improves through practice. To avoid the feeling of boredom and to sustain the flow, a more skilful person seeks a higher challenge level. Finally, according to the self-determination theory (Deci, 1980), in order to be competent and self-determined, people usually look for challenges which are well within their ability. If the challenge is too easy and lower than their ability, they seek a more difficult one, but if the challenge is too hard, they move on to one that is easier. People engage in non-optimal activities only when they are under external pressures or rewards (Deci and Ryan, 1985).

In typically developing people, under normal circumstances challenge seeking usually results in success, gives a sense of pleasure and competence and, if it meets with approval, produces a high tendency to look for subsequent challenges, especially in boring situations where no optimal challenge is provided (Harter, 1978). Nevertheless, due to their history of repeated failures especially in challenging situations, people with intellectual disability usually have a low desire to demonstrate any challenge seeking behaviour (Zigler and Bennett-Gates, 1999).

Intellectual disability (ID) is defined as “disability characterised by significant limitation in both intellectual functioning and adaptive behaviour as expressed in conceptual, social and practical adaptive skills” (AAIDD, 2002). People with intellectual disability may have from a variety of cognitive and physical problems which negatively affect their functional abilities. These include attention problems, limitation in long and short term memory, inability to use learning strategies, speech and language problems as well as difficulty in fine motor skills and sensory-motor coordination (Taylor et al, 2005). The low functional abilities of people with intellectual disability, given their cognitive or

physical problems, are usually reflected in their failures, especially when they engage in some physical, social, or cognitive challenging situations (Zigler and Bennett-Gates, 1999).

Repeated failures in different mastery situations, experienced by people with intellectual disability, usually results in their low tendency to participate in subsequent challenging situations in the long-term (Zigler and Bennett-Gates, 1999). One theory which justifies the negative effect of repeated failures on reduced challenge seeking behaviour in people with intellectual disability is Harter's model of effectance motivation (Harter, 1978). Based on this model, any physical, social, or cognitive challenging attempts which result in failure may induce a feeling of anxiety, external perception of control, perceived lack of competence, and consequently a low effectance motivation. People with low effectance motivation usually tend neither to get involved in subsequent mastery attempts nor look for new challenges. Some researchers who studied motivational problems in participants with intellectual disability have supported Harter's model in this population (Harter, 1974; Balla and Zigler, 1979; Zigler and Balla, 1981; Zigler and Hodapp, 1991; Gilmore et al, 2003; Niccols et al, 2003). The researchers proved the low mastery or effectance motivation in children with intellectual disability, and confirmed their low tendency to demonstrate any challenge seeking behaviour in different physical, cognitive or academic domains.

It can be assumed that stimulating people with intellectual disability by involving them in innovative behaviour may enhance their novelty and challenge seeking behaviour. This requires a special intervention programme with appropriate strategies such as scaffolding strategy, zone of proximal development, and modelling creative features in a music intervention programme. Here, the intellectually mastered fundamental musical tasks can provide the best opportunity for stimulating innovation as an index of challenge seeking.

Scaffolding strategies and zone of proximal development are offered as facilitators of exploratory behaviour and novelty among all people including those with intellectual disability (St-Joun, 2004; Flum and Kaplan, 2006). Zone of proximal development (ZPD) is related to Vygotsky's theory that is applicable in educational settings, especially for persons with intellectual disability. ZPD refers to the distance between what a learner could do independently and what he or she could do under guidance of adults or more capable peers (Vygotsky, 1978). Scaffolding is another concept in Vygotsky's theory which originated from ZPD

and refers to a process in which an adult or a more capable peer helps the learner in his/her ZPD as required. Many educators, trainers and teachers have used scaffolding methods in a variety of remedial and educational settings, especially those meant for people with intellectual disability.

A useful scaffolding strategy to promote novelty during musical activities is 'question and answer' with music. Thus, one person plays music as a question and another person plays something almost similar in return as an answer. During a music intervention programme for people with intellectual disability, a teacher could use a simple musical instrument to play a simple original melody as a question, and encourage the participant to perform a similar new melody as a response. Gradually the teacher could withdraw and encourage the participant to use both his/her own hands, so that one hand would play a new melody as the question and the other hand would answer by playing a similar melody.

The novelty and innovative attributes of persons who have mastered enough skills or knowledge could be enhanced by studying the creative activities of others, or by imitating innovative models created by teachers (Flum and Kaplan, 2006). Performing creative tasks through imitation is a common practice for individuals working in a creative domain (Lieberman and Asaba, 2006). In this context, imitation is treated as intentional and goal-directed behaviour, in which a person does not just copy the observed behaviour, but also selectively comes up with modifications (Haris and Want, 2005). In such a setting, imitation of an exemplar's successful behaviour may influence creativity positively, because the exemplar may serve as a guide for appropriate creative behaviour and thereby provide the impetus to generate a larger number of creative performances. It has been observed that exposure to creative models encourages participants to be innovative (Coon, 2006).

## **OBJECTIVE**

This study aims mainly to determine the effect of stimulating novelty and challenge seeking on the innovative behaviour of persons with intellectual disability, using the above mentioned strategies in a music intervention programme. It also intends to reveal the tendency of these participants to demonstrate challenge seeking behaviour in a boring musical situation where no optimal challenge is provided.

## METHOD

### Participants

From a population of 120 adolescents and young adults with intellectual disability, 30 participants were randomly selected at 2 vocational training centres and 1 sheltered workshop of Wisma Harapan organisation in Malaysia. They were 20 males and 10 females, aged between 15 and 25 years. On the basis of their IQ scores, based on the AAIDD (2002), the psychologist of the organisation found the participants had mild to moderate intellectual disability. They had all grown up amidst their families and communities, attended special primary schools, and had no behavioural problems, paralysis or deafness. Their parents or guardians signed the informed consent form and agreed to their participation in the research project. In addition, written consent was obtained from the manager of the organisation.

### Research Design

It is difficult for most researchers dealing with special populations to find a large sample of participants for a between-group experimental design. A within-subject design, which requires the formation of only one group, is considered as an applicable alternative (West et al, 2004). Moreover, given the high level of individual differences among special populations (Foreman, 2009), using a within-subject experimental design removes the variance caused by individual differences (Gravetter and Forsano, 2008). Thus, in the current study, a one group repeated-measure experimental design was used to manage the sample, handle individual teaching process, and remove variance caused by individual differences. A 30-session music intervention programme with 3 conditions was appropriately planned for the repeated-measure experimental design. A small quiet room with appropriate facilities was selected as the experimental room, and all 30 participants were invited to visit it and take part in a half-hour individualised session, twice a week.

### First Condition of the Music Programme

The first condition of the music intervention conducted during the first 10 sessions of the programme was labelled as “providing optimal challenge”. It was arranged to teach fundamental musical tasks to each participant individually, using special teaching strategies and an appropriate musical instrument. The

special teaching strategies were (a) musical task analysis, in which the tasks to be taught were broken down into smaller and sequential units, (b) stating the lesson's goals clearly and providing appropriate feedback, (c) repeating materials, skills and concepts several times, (d) speaking in short simple sentences without talking down, (d) performing one musical task rather than multiple tasks, (e) adapting the amount of time allocated to complete a task, and (f) using auditory rote learning or, in other words, teaching music by ear instead of notation. The musical instrument used during the teaching process was a metal Xylophone, a standard musical instrument which is simple and makes beautiful sounds.

A continuum of 14 musical tasks with varying challenge levels, from very simple to more complex ones, was used. These tasks were selected during a trial run, based on their appropriateness to Malaysian culture. Due to their individual differences, each participant went through the continuum and mastered progressive tasks based on his/her own potential ability. With this individual teaching process, at the end of the first condition, 6 participants mastered the first three tasks, 11 participants mastered the first four tasks, 7 participants mastered the first five tasks, and 6 participants mastered the first six tasks.

### **Second Condition of the Music Programme**

The second condition of the experiment, introduced during the subsequent 10 sessions of the music programme, was labelled as "providing no challenge". It was a boring situation in which the experimenter did not provide any new tasks with higher level of difficulty to the participants. Instead, the participants were free to experiment with the tasks that they had already mastered during the first condition, or to perform innovative tasks, or do nothing at all.

### **Third Condition of the Music Programme**

The third condition of the experiment, conducted during the last 10 sessions of the music programme, was labelled as "stimulating to look for novelty and challenge". It was arranged so as to encourage the participants to undertake fresh original tasks by using modeling, creative features and 'question and answer' as a scaffolding strategy. With respect to modelling strategies, based on the ability of the participant, the experimenter modelled some simple creative musical tasks and then encouraged the participant to do something similar in his/her own way. To use 'question and answer' as a scaffolding strategy, the experimenter first performed a simple creative melody as a question. Then he took his hands off

the instrument and used his eyes with reference to the instrument to encourage the participant to play his/her own innovative melody as a response to the experimenter's question. Thereafter, the experimenter gradually tapered off his involvement and encouraged the participant to use one of his/her own hands as a questioner and the other as the respondent. Through this strategy, the participant learned to reply to his/ her own innovative questions with his/her own creative responses.

Since novelty and challenge seeking is a type of intrinsically motivated behaviour, it can be measured using the behavioural measure of intrinsic motivation. The behavioural measure of motivation is a valid strategy to measure intrinsic motivation during any activity, especially in laboratory research in psychology (Guay et al, 2000). It is a measure of situational intrinsic motivation based on the time that a participant spends on the activity without any external rewards or pressure (Guay et al, 2000).

Following this procedure, during the last session of each condition of the music programme the experimenter would declare that the experiment was formally over and make an excuse to leave the participant alone for a limited period of time (8 minutes). During this free choice interval the behaviour of the participant was secretly observed, to measure the amount of time that he/she spent on making innovations as an index of his/her challenge seeking behaviour.

## RESULTS

The results of descriptive data analysis including maximum, minimum, mean, standard deviation, and mean rank of innovation scores in each condition of the experiment are presented in Table 1.

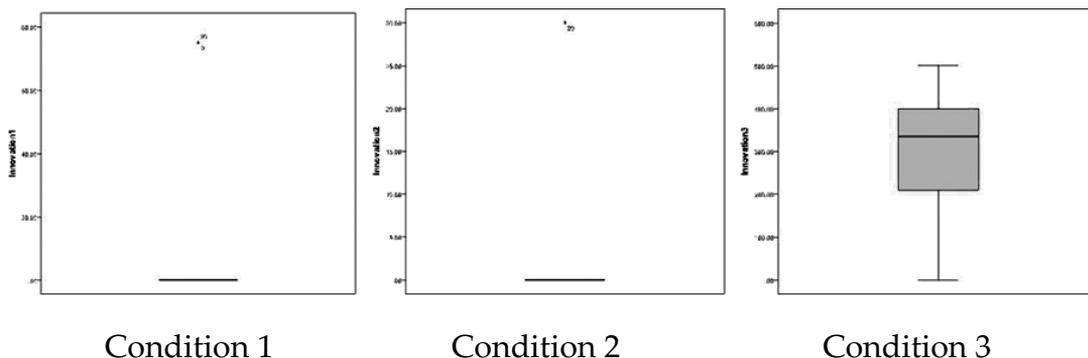
**Table 1: The Results of Descriptive Data Analysis**

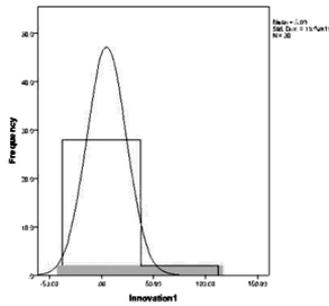
Variable	Minimum	Maximum	Mean	S.D.	Mean Rank
Innovation 1	00	75.00	5.00	19.02	1.93
Innovation 2	00	30.00	1.00	5.47	1.92
Innovation 3	00	502.00	310.01	131.01	3.93

Table 1 shows that the low level of innovation scores, with mean rank of 1.93 in condition 1, where the participants were taught fundamental musical skills, decreased slightly to mean rank of 1.92 in condition 2, where no optimal challenge was provided. However, in condition 3, where the participants were stimulated to look for challenge through involvement in innovative behaviour, the innovation scores increased to a much higher level with a mean rank of 3.93.

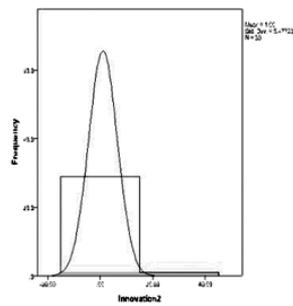
The Box plots (Figure 1) revealed that there were two outliers in condition 1, one outlier in condition 2, and no outlier in condition 3. The Histograms (Figure 1) revealed that the innovation scores in condition 1 were positively skewed (skewness=3.66) and the Fisher's coefficient of skewness was 8.71. In condition 2, the skewness of the scores was 5.47 and the Fisher's coefficient of skewness was 13.02. Finally, in condition 3, the skewness of the scores was -.65 and the Fisher's coefficient of skewness was -1.54. Since the Fisher's coefficient of skewness of the scores in at least two conditions were more than +2, according to Laurentis et al (2010) the scores distribution in these conditions could not be considered as normal distribution. Thus, Friedman's ANOVA, as a non-parametric test for several related samples (Leech et al, 2007), was used to determine the overall significant differences in innovation scores across the 3 conditions of the experiment. Application of this inferential statistical test showed that there were some statistically significant changes in innovation scores over the 3 conditions of the experiment,  $\chi^2(2, 30) = 77.03, p < .001$ .

**Figure1: The Box Plots and Histograms of the Score in Three Conditions**

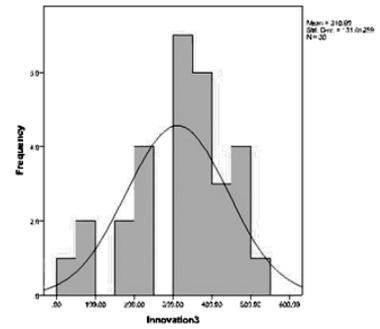




Condition 1



Condition 2



Condition 3

Following Friedman's ANOVA, based on the non-directional hypothesis two-tailed Wilcoxon signed-rank test with Bonferroni correction (Field, 2009) was conducted to determine whether the observed differences between the mean ranks of the scores in each pair of conditions was significant. The results showed that there was no significant difference between the innovation scores in conditions 1 and 2,  $Z = -1.089$ ,  $p > .008$ . In addition, the size of the experimental effect was .17 which, based on Cohen (1988), is a small effect size. It means that participants with intellectual disability showed low and same levels of innovation in both conditions 1 and 2 – condition 1, where they were provided optimal challenge through teaching fundamental skills, and condition 2, where they were not provided any challenge. In making comparisons between conditions 2 and 3, there was a significant difference with large effect size (Cohen, 1988),  $Z = -4.70$ ,  $p < .008$ ,  $r = .74$ . The results revealed that the low level of innovation in condition 2, where no optimal challenge was provided, significantly increased to a very high level in condition 3, where the participants were stimulated to get involved in innovative tasks. Moreover, in making comparisons between conditions 1 and 3, the results showed a significant difference with a large effect size,  $Z = -4.50$ ,  $p < .008$ ,  $r = .73$ . It means that the participants showed a significantly higher level of innovation in condition 3 than in condition 1.

## DISCUSSION

This study aimed mainly to determine the effect that stimulating participants with intellectual disability to look for novelty and challenge would have on their challenge seeking behaviour. The intention was also to examine the tendency of the participants to demonstrate novelty and challenge seeking when no challenge was provided. To this end, comparisons were drawn between the levels

of innovation, as an index of challenge seeking, in 3 different conditions of the music programme: condition 1- where the participants involved were provided challenging tasks, condition 2 - where no challenging tasks were provided, and condition 3 – where they were provided tasks which stimulated challenge seeking. The results showed that the participants demonstrated a significantly higher level of innovation in condition 3 than in both conditions 1 and 2. Moreover, there was no significant difference between the low levels of innovation in conditions 1 and 2.

A possible explanation for the low level of innovation in condition 1 might be that since adequate challenges were already provided, the participants had no desire to seek out any additional challenge by exhibiting innovative behaviour. However, this logical explanation does not justify the low level of innovation in condition 2, where no new challenges were provided. Instead it confirmed one important motivational problem of people with intellectual disability, namely their low tendency to seek-out optimal challenge when it is not provided for them (Zigler and Bennett-Gates, 1999).

As mentioned earlier, according to intrinsic motivation theories (White, 1959; Csikszentmihalyi, 1975; Deci and Ryan, 1985) people usually have a desire to seek out optimal challenge, especially in boring situations when they are not under any external pressure or offered any reward. However, as mentioned by Zigler and Bennett-Gates (1999), people with intellectual disability have a low tendency to look for challenge and improve their intrinsic motivation, especially in boring situations, due to their history of repeated failures in different mastery situations. The low level of innovation in condition 2 of the current study, an index of challenge seeking behaviour, supports the idea of Zigler and Bennett-Gates (1999).

The low level of innovation in the second condition of the study is also in line with other studies which, based on Harter's model, proved the low tendency of people with intellectual disability to seek out optimal challenge (Harter, 1974; Balla and Zigler, 1979; Zigler and Balla, 1981; Zigler and Hodapp, 1991; Gilmore et al, 2003; Niccols et al, 2003). These studies viewed the issue from a problem-solving point of view, using manipulating mazes, puzzles, and shape sorters. However, the current study proved the low desire of adolescents or young adults with intellectual disability to seek-out optimal challenge in a music intervention programme which focussed on mastering, and not solving, the problems.

The significantly higher level of innovation in condition 3, compared to the other two conditions of the experiment, showed the effectiveness of stimulating people with intellectual disability to be innovative. It confirmed that despite their history of repeated failures, which gives rise to their low tendency to seek out new challenges, participants with intellectual disability are able to look for challenges when they are stimulated to do so.

The capability of participants with intellectual disability to be innovative has an important practical implication, especially for those who try to improve self concepts, self efficiency, effectance motivation and the emotional or psychological problems of such persons. According to some well-known intrinsic motivation theories, especially Harter's model of effectance motivation, successful experiences with optimal challenges may induce feelings of pleasure, internal perception of control, perceived competence and consequently a high level of intrinsic motivation. Providing innovative musical tasks in a musical environment for participants with intellectual disability could be the best opportunity to involve them in optimal challenging successful experiences. This could in turn lead them to feel pleasure, competency, internal perception of control and finally, a high level of effectance motivation.

## CONCLUSION

This study is the first research aimed mainly at investigating the effect of challenge seeking stimulation on challenge seeking behaviour in persons with intellectual disability. From the findings it can be concluded that although the participants showed no novelty or challenge seeking behaviour in a boring situation where no challenge was provided, they were highly capable of innovation when they were stimulated. However, there were some limitations that can be pointers to avenues for future research on the same theme. Firstly, the results of the study can be applicable in a musical context using the mentioned special strategies and they might not be generalised to the other circumstances. Hence further research is recommended to study the effectiveness of other intervention programmes. Secondly, since it was not possible to assemble multiple groups with adequate number of participants in this study, given the limited time, it is suggested that further research be carried out using a between-subject experimental design to obtain more accurate results. Finally, when interpreting the results, it might be interesting to study the gender differences in innovative behaviour, if any, between men and women. Due to the limited number of participants, especially

the smaller number of female participants available for this study, drawing such comparisons was statistically impossible. Further research using appropriate number of participants is recommended, to note the differences in innovative behaviour between men and women.

## Acknowledgement

For providing support and facilitation during the experiment and data collection, the authors would like to thank Mr Kamaraj, Manager, Selangor and Federal Territory Association for the Mentally Handicapped.

## REFERENCES

- American Association on Intellectual and Developmental Disabilities (2002). *Mental retardation: definition, classification and systems of supports*. Washington American Association on Mental Retardation.
- Balla D, Zigler E (1979). Personality development in retarded persons. In *Handbook of Mental Deficiency*: Hillsdale, NJ: Erlbaum.
- Cohen J (1988). *Statistical power analysis for the behavioural sciences* (2 ed.): New York: Academic Press.
- Coon D (2006). *Psychology: a modular approach to mind and behaviour*: Wadsworth, Thomson Learning.
- Csikszentmihalyi M (1975). *Beyond boredom and anxiety: The experience of flow in work and games*. San Francisco: Jossey-Bass.
- Deci EL (1980). *The psychology of self-determination*: Lexington, MA: D C Heath.
- Deci EL, Ryan RM (1985). *Intrinsic motivation and self-determination in human behaviour*. New York: Plenum Press. PMID:3841237.
- Field A (2009). *Discovering statistics using SPSS* (3 ed.): SAGE Publication Ltd.
- Flum H, Kaplan A (2006). Exploratory orientation as an educational goal. *Journal of Educational Psychologist*; 41(2): 99 -110. [http://dx.doi.org/10.1207/s15326985ep4102\\_3](http://dx.doi.org/10.1207/s15326985ep4102_3)
- Foreman P (2009). *Education of students with intellectual disability: research and practice*. United States: Information Age Publishing Inc.
- Gilmore L, Cuskelly M, Hayes A (2003). A comparative study of mastery motivation in young children with Down Syndrome: similar outcomes different process? *Journal of Intellectual Disability Research*; 47: 181-190. <http://dx.doi.org/10.1046/j.1365-2788.2003.00460.x>. PMID:12603515.
- Gravetter FJ, Forzano LAB (2008). *Research method for the behavioural sciences* (3 ed.). USA: Wadsworth Cengage Learning.
- Guay F, Vallerand RJ, Blanchard C (2000). On the assessment of situational intrinsic and extrinsic motivation: the situational motivation scale (SIMS). *Journal of Motivation and Emotion*; 24(3): 175-213. <http://dx.doi.org/10.1023/A:1005614228250>.

- Harris PL, Want S (2005). On learning what not to do: the emergence of selective imitation in tool use by young children. In S Hurley and N Chater (Eds.), *Perspective on imitation: From neuroscience to social science, Vol.2. Imitation, human development, and culture* (pp. 146-162).
- Harter S (1974). Pleasure derived by children from cognitive challenge and mastery. *Child Development*; 45: 661-665. <http://dx.doi.org/10.2307/1127832>. PMID:4143822.
- Harter S (1978). Effectance motivation reconsidered: toward a developmental model. *Human Development*; 21(34): 34-64. <http://dx.doi.org/10.1159/000271574>.
- Leech NL, Barrett KC, Morgan GA (2007). *SPSS for intermediate statistics: use and interpretation* (3 ed.): New York: Lawrence Erlbaum Associates.
- Lieberman MB, Asaba S (2006). Why do firms imitate each other? *Academy of Management Review*; 31: 366-385. <http://dx.doi.org/10.5465/AMR.2006.20208686>.
- Niccols A, Atkinson L, Pepler D (2003). Mastery motivation in young children with Down Syndrome: relation with cognitive and adaptive competence. *Journal of Intellectual Disability Research*; 47: 121-133. <http://dx.doi.org/10.1046/j.1365-2788.2003.00452.x>. PMID:12542578.
- St-Joun A (2004). *An investigation of the relationship between flow experience and the role of scaffolding in a Kindermusik classroom*. Columbia University.
- Taylor, Richards SB, Brady MP (2005). *Mental retardation: historical perspective, current practice and future directions*. Boston: Pearson Allyn and Bacon.
- Vygotsky LS (1978). *Mind in society: The developmental of higher psychological processes*: Cambridge, MA: Harvard University Press.
- West SG, Biesanz JC, Kowok OM (2004). Within-subject and longitudinal experiments design and analysis issues. In *The Sage handbook of methods in social psychology*: Sage Publication, Inc.
- White RW (1959). Motivation reconsidered: the concept of competence. *Psychological Review*; 66(5): 297-333. <http://dx.doi.org/10.1037/h0040934>. PMID:13844397.
- Zigler E, Balla D (1981). Issues in personality and motivation in mentally retarded persons. In *Psychological Influence in Retarded Performance*: Baltimore, MD: University Park Press. PMID:370912.
- Zigler E, Bennett-Gates D (1999). *Personality development in individuals with mental retardation*: The Press Syndicate of the University of Cambridge.
- Zigler E, Hodapp RM (1991). Behavioural functioning in individuals with mental retardation. *Annual review of psychology*; 42: 29-50. <http://dx.doi.org/10.1146/annurev.ps.42.020191.000333>. PMID:1826825.