Research Article

PERR
PSYCHO-EDUCATIONAL RESEARCH REVIEWS

Psycho-Educational Research Reviews
13(*3*), 2024, 148-158
www.perrjournal.com

The Effects of Principles of Powerful Learning Environment on Motivation to Learn Among Students with Learning Disabilities

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Keywords

Powerful learning environment
Motivation
Students with learning disabilities
Middle school

Article Info:
Received : 17-06-2024
Accepted : 13-12-2024
Published : 22-12-2024

DOI: 10.52963/PERR_Biruni_V13.N3.02

Abstract

The aim was to investigate the effects of principles of powerful learning environment (PLE) on motivation to learn among students with learning disabilities (LD). A sample of 56 students in 8th grade with LD in two middle schools were recruited. The research used the quasi-experimental approach due to its suitability to the nature of the research, which relies on the experimental design based on two groups, one experimental and the other control, and by using the pre- and post testing of the two groups. The effects of the principles of (PLE)were assessed using ANCOVA, repeated-measures, pre- post- and follow up testing design. Using a pre-test–intervention–post-test, and follow up design, it has been shown that (PLE) was effective in improving motivation to learn among students with LD. The results found by this study using (PLE) indicate the effectiveness of this method with students with LD.

To cite this article: Fatahalla, M. M. (2024). The effects of principles of powerful learning environment on motivation to learn among students with learning disabilities. *Psycho-Educational Research Reviews, 13*(3), 148-158. doi: 10.52963/PERR_Biruni_V13.N3.02

INTRODUCTION

Individuals with LD are characterized by inaccurate or slow and effortful word reading (Eissa, 2015; Elhoweris, 2017; Gomaa, 2015 ; Mostafa, 2017),difficulty understanding the meaning of what is read(El Banna, 2019; Hendi, 2015), difficulties with spelling (Kader & Eissa, 2016; Mohammed, 2014; Nassar, 2015), difficulties mastering number sense, number facts, or calculation (APA, 2013; Eissa, 2018)and difficulties with mathematical reasoning (ElAdl, 2020; Khalik, 2014).

The traditional approaches to teaching and learning are not compatible with the characteristics of students with LD, as it leads to them feeling bored, as well as making them passive and more hostile and resistant to the teacher (Eissa & Mostafa, 2013). Therefore, teaching methods appropriate to the characteristics of this category must be followed, taking into account their learning methods, providing them with a positive and enjoyable atmosphere for learning, integrating them in the learning process with every activity, challenging their abilities and arousing their desire to learn, enthusiasm and vitality (Gomaa, 2014; Winarti etal., 2022).

Students who are competent with digital technologies can access learning resources through a variety of online media, such as YouTube, social media sites, tablets, mobile devices, and video games (Camilleri & Camilleri, 2021; Johannesen et al., 2019). Motivated and techno-confident students can draw from these online resources to clarify and reinforce what they have learned in lectures (Pillutla et al., 2020).

The concept of “powerful learning environments” is an embodiment of the main ideas of the constructivist approach to teaching and learning (Ahmady & Khani, 2022). This approach is based on the belief that students should be directed to build knowledge that is meaningful and useful in their own lives (Cilliers,2021). The focus is primarily on “how” students learn and not “what” they learn (Muhammad,2021). PLE framework is also based on the belief that the success of teaching and learning activities depends on the ingenuity of teachers in creating a classroom climate conducive to active learning through which learners construct their reality in social interactions with others (Ahmady & Khani, 2022). PLEs also refer to environments designed in such a way as to enhance the learning processes necessary to achieve desired learning outcomes (Placklé et al.,2018; Roos et al.,2021)

PLEs promote optimal learning processes. They provide rich and authentic contexts and tasks as possible. These environments also provide links to the world outside of school, stimulating active and independent and collaborative learning and adapting curricula to individual pupils' needs and abilities (Placklé et al.,2018). PLEs also provide increased opportunities for reflection through which students develop deeper understanding and awareness of cognitive and metacognitive as well as increased opportunities to develop their skills and motivation to learn through cooperation with others (Ahmady & Khani, 2022).

PLEs combine the advantages of active learning, constructivist learning, cooperative learning, case-based learning, as well as problem-based learning, where they start teaching from what the student knows and can do, take student motivation into account, provide more feedback to students and seek to empower the student and focus on competencies rather than knowledge as well as support the use of examples and discussions, all in an atmosphere full of care and attention of the teacher (Albayrak & Serin,2022). Accordingly, this line of reasoning leads to a theoretical conclusion that " PLEs have the potential to improve motivation to learn for students with LD, but this conclusion remains in need of empirical research to prove its validity (Placklé et al.,2020).

On the other hand, students with LD suffer from neglecting homework, not entering academic competitions, and unwillingness to participate in school activities. They also suffer from distraction and hypersensitivity, and they believe that they cannot learn and are afraid of failure, and they also suffer from lack of motivation to learn (Eissa,2012, Mostafa ,2017).

PURPOSE

The aim was to investigate the effects of Principles of Powerful Learning environment on Motivation to Learn Among Students with LDs. It is assumed that instructional program based on the principles of PLEs will improve motivation to learn among students with LDs.

LITERATURE REVIEW

PLEs are based on constructivist theory. Constructivists assert that pupils are not just passive recipients of knowledge, but actively participate in constructing their own meaning. PLEs enable students to gain new knowledge and then put it into practice (Sinakou et al., 2019). In addition, PLEs provide students with opportunities for discovery and research and investigation. they provide them with immediate feedback, clear models for performing various tasks, and show them the cognitive and metacognitive components of the tasks assigned to them (Placklé et al.,2020).

There are many factors that facilitate learning in PLEs, namely: matching the student's previous knowledge, skills, plans, interests, values and needs, taking the student's motivation into account, paying attention to feedback, and teaching organized in a logical way for the learner, as well as providing the opportunity for work collaboration with peers, using examples and discussions, paying attention to the context of performance (so that knowledge and skill can be benefited from), caring for students, and finally integrating assessment and learning (Könings et al., 2005;De Corte,1990). There is now a broad consensus that effective learning occurs when learning environments are 'powerful' stimulating learning which is "constructive, cumulative, self regulated, goal-oriented, situated, collaborative' and taking into account 'individually different process of meaning construction and knowledge building" (De Corte, 1996, 106).

POWERFUL LEARNING ENVIRONMENTS ARE BASED ON THE FOLLOWING PRINCIPLES:

Learner Centered: A learner-centered learning environment aims to ensure that any activity in the classroom begins by paying close attention to learners' ideas, knowledge, skills, attitudes, learners' preconceptions about the topic, their cognitive experiences, their cultural and social backgrounds, and their cognitive abilities, which provide the basis from which new learning begins (Baeten et al.,2016;Moreeng & Toit, 2013; Schelfhout et al., 2006)

Knowledge Centered: A knowledge-centered learning environment is characterized by an emphasis on what is taught, and why is it taught? How should knowledge be organized to support the development of learners' experiences? In addition to how to master the learning content, knowledge should not be taken as a list of facts and formulas relevant to its field. Instead, learners' knowledge must be organized around key concepts or big ideas that guide thinking (Baeten et al.,2016).

Assessment Centered: Assessment is the key feature of a knowledge-centered learning environment, a learner-centered learning environment, and one of the challenges in the classroom is the absence of a direct link between instructional objectives and assessment, as teachers tend to see assessment as separate from the teaching and learning process. Therefore, assessment should be used as an educational opportunity to improve learning, rather than only assessing learners. The focus of evaluation has changed with the advent of the results-based approach. Learners are no longer required to demonstrate not only their knowledge but also their skills and values (Glasgow & Hicks, 2003; Kotze, 2002).

Community Centered: Community-centeredness means developing rules and channels of communication between the classroom and the outside world to support core learning values, as learning is influenced by the context in which it takes place. A community-centered learning environment also includes setting a set of classroom management standards, whereby each class operates according to the set of explicit or implicit cultures or standards that affect interactions between individuals. This set of standards in turn mediates learning, and standards established in the

classroom have powerful effects on academic achievement. These standards may support students in revealing their preconceptions about the topic and their questions, and a community-centered learning environment focuses on developing a sense of community for the classroom environment by helping learners solve problems by building on each other's knowledge, asking questions and suggesting answers (De Corte & Masui, 2004)

HYPOTHESES

1- The experimental group (that is exposed to the instructional design based on the principles of PLEs) will gain better motivation to learn test scores in post test over the control group (that is taught in a traditional way).

2- PLEs is effective in improving motivation to learn of experimental group, and this effect is still evident a month later.

METHODS

PARTICIPANTS

A sample of 56 students in grade 8 with LD in two middle schools in Kafr EL Sheikh Governorate, Egypt was invited to participate in the study. Criteria of inclusion were as follows: 1) demonstrating low achievement scores according to teacher's reference (i.e., at least 1.5 [SD] below their same age people (Mourad, 2018, P.109), though their normal levels of intellectual functioning (Mourad, 2012), b) the absence of any neurological or motor disorders, 3) Low motivation to learn score. The sample was randomly divided into two groups; experimental (n= 26, 16 boys, 57.14% and 10 girls, 35.71%) and control (n= 28 ,20 boys, 71.42% and 8 girls 28.57%). The two groups were matched on age, IQ, and motivation to learn test score (See table 1). Table 1. shows that all t- values did not reach significance level. This indicated that the two groups did not differ in age, IQ, and Motivation to learn (pre-test).

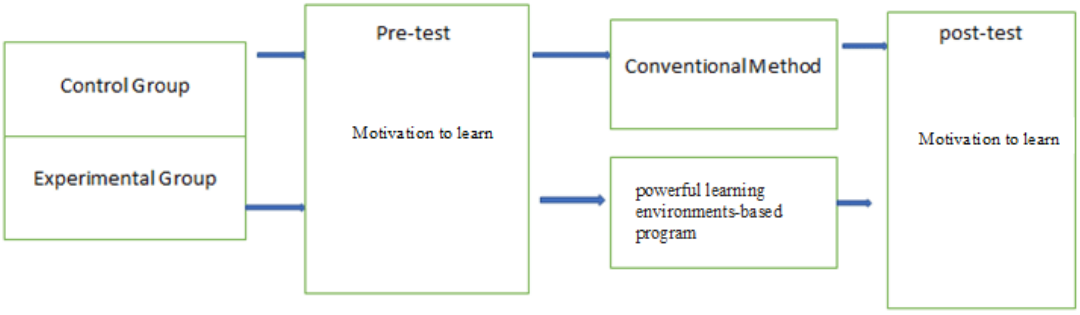
Table 1. *Pretest Mean Score, Standard Deviations and T-Value for Age (By Month), IQ, And Motivation to Learn.*

Variable	*Group*	*N*	*M*	*SD*	*T*	*P.*
Age	Experimental	28	167.6	1.96	-.081	-
	Control	28	167.9	2.01		
IQ	Experimental	28	113.93	4.45	-.251	-
	Control	28	114.20	4.24		
Motivation to learn	Experimental	28	75.21	3.00	-.587	-
	Control	28	75.67	3.52		

RESEARCH MODEL

The research used the quasi-experimental approach due to its suitability to the nature of the research, which relies on the experimental design based on two groups, one experimental and the other control, and by using the pre- and post-testing of the two groups (see fig.1).

Figure1. *Research Model*



DATA COLLECTION INSTRUMENT

Intrinsic and Extrinsic Motivational Orientations Scale (Mourad Ali Eissa, 2012). It is a 30-items scale. The Intrinsic and Extrinsic Motivational Orientations Scale consists of six subscales; three for Intrinsic Motivation (Challenge, Curiosity, Independent Mastery; 15 items), and three for Extrinsic Motivation (Easy Work, Pleasing Teacher, and Dependence on Teacher; 15 items). A three point Likert scale (agree=3, Uncertain= 2, and Disagree=1) was used. A pilot study was completed for 15 students with IDs in order to determine the clarity of the questionnaire, and unclear questions were updated. Answering the questionnaire took approximately 20 minutes.

Reliability analysis using Cronbach's Alpha showed that the scale used in this research was reliable as shown in Table 2.

Table 2. *Reliability Analysis*

Variable	*Cronbach's Alpha Based on Standardized Items*	*Remarks*
Intrinsic Motivation	0.87	Reliable
Extrinsic Motivation	0.89	Reliable
The whole scale	0.91	Reliable

The content validity of the scale was examined by a group of 5 experts. They assessed the relevance of each item using a four-point Likert scale (where 1 represents "irrelevant" and 4 represents "highly relevant"). They provided suggestions and comments. The 20 items were judged to be quite or highly relevant. A content validity index was calculated at the item level (I-CVI = 0.90).

PROCEDURE

Middle school students who participated met the following established criteria to be included in the study: 1) demonstrating low achievement scores according to teacher's reference (i.e., at least 1.5 [SD] below their same age people (Mourad, 2018, P.109), though their normal levels of intellectual functioning (Mourad, 2012), b) the absence of any neurological or motor disorders, 3) Low motivation to learn score. All the 56 students completed Intrinsic and Extrinsic Motivational Orientations Scale, which assesses students' intrinsic and extrinsic motivational orientations. Thus data was reported for the students who completed the study.

To design the program, the researcher prepared a list of principles for designing instruction based on PLEs, including a set of integrated principles related to student characteristics, educational objectives, learning content, teaching and learning strategies, and finally assessment methods.

There are some instructional strategies that are compatible with the characteristics and principles of PLEs, including: reciprocal teaching, cooperative learning in large groups and in small groups, and peer teaching. In addition to the aforementioned strategies, the researcher used the lecture strategy, discussion, brainstorming, think-pair share, what I know and what I want to know strategy, modeling, think-aloud strategy, project-based learning strategy, case-based learning strategy, and strategy-based learning strategy, scaffolding, context-based learning strategy, and problem-based learning strategy.

The program was also based on a variety of open and closed-ended group and individual educational activities, where students were given the opportunity to practice creative thinking skills, in an educational environment full of support, praise, care and feedback. Implementation of the program requires (120) minutes each week, including activities and workshops.

DATA ANALYSIS

The effects of the instructional program based on the principles of PLEs were assessed using ANCOVA, repeated-measures, pre- post- and follow up testing design.

FINDINGS

HYPOTHESES TESTING

Table 3 shows data on ANCOVA analysis. The table shows that the (F) value was (93.210, P < 0.01).

Table 3. *ANCOVA Analysis*

Source	*Type 111 sum of squares*	*df*	*Mean square*	*F*	*P*
PRE	1.823	1	1.823		
GROUP	143.115	2	71.557	93.210	0.01
ERROR	198.115	52	99.057		
TOTAL	867.142	55			

Table 4 shows t test results for the differences in post- test mean scores between experimental and control groups in motivation to learn scale. The table shows that (t) vale was (6.45, P < 0.01) in the favor of experimental group.

Table 4. *T- Test Results.*

Group	*N*	*Mean*	*Std. deviation*	*T*	*P*
Experimental	28	110.63	1.11	6.45	0.01
Control	28	78.89	2.10		

Table 5. shows data on repeated measures analysis for motivation to learn scale. The table shows that there are statistical differences between measures (pre- post- follow up) at the level (0.01).

Table 5. *Repeated Measures Analysis for Motivation to Learn Scale*

Source	*Type 111 sum of squares*	*df*	*Mean square*	*F*	*Sig.*
Between groups	432.360	1	432.360		0.01
Error 1	98.883	54	1.831	119.105	
Between Measures	572.223	2	286.111	101.102	0.01
Measures x Groups	396.886	2	198.443	98.013	0.01
Error 2	238.709	108	2.210		

Table 6. shows that there are statistical differences between pre and post measures in favor of post-test, and between pre and follow up measures in favor of follow up test, but no statistical differences between post and follow up test.

Table 6. *Scheffe Test for Multi- Comparisons in Motivation to Learn Scale*

Measure	*Pre* *M= 75.21*	*Post* *M= 110.63*	*Follow up* *M= 109.12*
Pre	--	--	--
Post	7.69*	--	--
Follow up	7.32*	.12	--

DISCUSSION

Using a pre-test–intervention–post-test, and follow up design, it has been shown that the instructional program based on the principles of PLEs was effective in improving motivation to learn among students with LD. The results found by this study using that the instructional design based on the principles of PLEs indicate the effectiveness of this method with students with LD.

This is an indication of encouraging curricula that have the potential of learning environments full of power, and that allow learners the opportunity to be more active and integrated. Also, identifying the characteristics, capabilities, and competencies of PLEs may help identify reasons why this educational reform is gaining more attention.

This may be due to the fact that stimulating learning environments are environments that promote active learning and constructive learning and provide opportunities for cooperative activities among students, as they provide learning experiences in their context and in real situations, including curricula, teaching processes and learning contexts to enable students to facilitate the acquisition of productive knowledge. In addition to learning and thinking skills, these environments create appropriate learning conditions for learning activities and processes that enable pupils to learn productively and solve problems.

This may also be due to the fact that stimulating learning environments are environments centered around the learner, knowledge, community and assessment, and provide a positive and enjoyable atmosphere for learning, and create multiple and thought-provoking opportunities that challenge students' abilities and arouse their desire to learn and enthusiasm with the aim of achieving efficient and optimal learning and enabling them to achieve the maximum of their potentials and abilities.

There are many factors that facilitate learning in PLEs, namely: matching the student's previous knowledge, skills, plans, interests, values and needs, taking the student's motivation into account, paying attention to feedback, and teaching organized in a logical way for the learner, as well as providing the opportunity for work Collaboration with peers, using examples and discussions, paying attention to the context of performance (so that knowledge and skill can be benefited from), caring for students, and finally integrating assessment and learning.

The program used in the current study led to the activation of the student's previous knowledge and previous experiences; And then building new knowledge from the pre-existing knowledge, showing the student new skills or knowledge through modeling, giving the student the opportunity to apply his new knowledge and skills, and finally integrating the newly acquired skills and knowledge into the student's realistic activities.

This result may be due to the characteristics of the PLEs, which are learner-centered, where explanations are provided for different ideas and difficult concepts (Baeten et al.,2016;Paas & Kester, 2006). This result may also be due to the fact that the program has taken into account the feature of knowledge-centered, which is characterized by providing clear instructions and explanation of the tasks required of students, helping students to organize information, understanding the relationships between various topics, encouraging students to provide different answers to questions, and clarifying how to analyze sources of information for students, and finally allowing the use of different sources of information (Bransford et al.,2000 ;De Corte & Masui, 2004).

This result may also be due to the fact that the program has taken into account the feature of assessment-centered, as the assessment allowed students to choose the method of evaluation, choose the projects required of them, obtain immediate and sufficient feedback, and finally gave them the opportunity to ask questions to ensure their understanding of the topic (Glasgow and Hicks, 2003; Kotze, 2002).

In addition, the program allowed community-centered learning that made students feel comfortable asking questions from their teachers inside and outside the classroom, and allowing them to discuss ideas with their friends, as well as teachers walking around the classroom to provide guidance to students, and students listening to advice from their classmates study, as well as the learner sharing books with colleagues, helping them with their work, receiving help from colleagues, teamwork and further explaining the nature of PLEs (De Corte & Masui, 2004).

As ElAdl & Eissa (2019) assert, it is favorable to change the teaching and learning environment from that of teacher dominance (teacher-centered approach) into that of student autonomy (learner-centered learning approach). So, the educational environments that give students the opportunity to experience activities for sure motivate students to learn and succeed, as well as being creative thinker.

CONTRIBUTIONS

Theoretically, this research contributes to the body of knowledge in some aspects. The present study expanded the literature by revealing the effectiveness of an instructional program based on the principles of PLEs to improve motivation to learn among students with LD. Traditional classroom instructions fall short of providing an immediate learning environment, faster evaluations, and more engagement. In contrast, digital learning tools and technology fill this void.

CONCLUSION

Educators design PLEs, from classroom and e-learning environments to complete educational curricula, such as problem-based learning and competency-based learning. However, designing an educational environment that is well suited to reach modern education goals is not a guarantee of practical success. Implementation is crucial in determining the realistic characteristics of the learning environment that affect students' learning; Since educators other than designers often apply already designed learning environments, it is useful to study the concepts teachers have about learning and teaching. PLEs help develop learners' cognitive abilities by using specific tools of support called cognitive tools and learning scaffolding, which help learners in cognitive processes such as: planning the learning process, understanding data from experience, or preparing hypotheses. Through these tools, PLEs improve learners' cognitive power. They are also tools to enhance, support and facilitate the acquisition of knowledge and practice of skills, and they encourage students to participate in the challenges of the learning process offered by the learning environment.

Therefore, PLEs combine the advantages of active learning, constructivist learning, cooperative learning, case-based learning, as well as problem-based learning where they start teaching from what the student knows and can do, takes student motivation into account, and provides more feedback to students. It seeks to empower the student and focuses on competencies rather than knowledge and supports the use of examples and discussions. All this is done in an atmosphere full of care and attention of the teacher. Although modern information and communication technology is very suitable for implementing PLEs, this is not necessarily the case. Many attempts to use computer-based education and training programs or many smart education systems adhere to a more traditional concept of learning that focuses on the transfer and preservation of elements of knowledge and skills. On the other hand, the training in solving problems without relying on technological devices developed by Schoenfeld (1985) is an example of how to design PLEs that enable active, constructive and collaborative learning (van & Paas,2003).

LIMITATIONS AND FUTURE RESEARCH DIRECTIONS

The research is not without limitations. The sample used in this research was limited to students in grade 8 with LD in two middle schools in Kafr EL Sheikh Governorate. In that case, it is recommended to include students from other geographical area, grades or other disabilities, resulting in an in-depth analysis. It is needed to support the generalizability of the findings in this study by considering larger populations. Further research is needed to support the generalizability of the findings in this study by considering larger populations from different geographical areas.

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