

Collaborative Learning Technologies in Teaching Preschool Twins

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This paper focuses on applying collaborative learning technologies in teaching preschool twins and reveals the role of collaborative learning in the formation of twins' self-awareness. At the ascertaining stage of the experiment, 100 twins of preschool age took part. At the formative stage of the experiment, 16 preschoolers took part. At the formative stage of the experiment, an empirical assessment was carried out based on empirical indicators of the process and result of joint task performance by twins before and after participation in the formative experiment. An empirical study of the peculiarities of intrapair interaction in collaborative activities of preschool twins has shown effects that are a consequence of the twin situation. The use of collaborative learning in the psychological and pedagogical support of preschool twins has allowed obtaining positive results expressed in an increase in self-esteem, motivation for cooperation, and a decrease in aggressiveness and rivalry in a pair of twins.

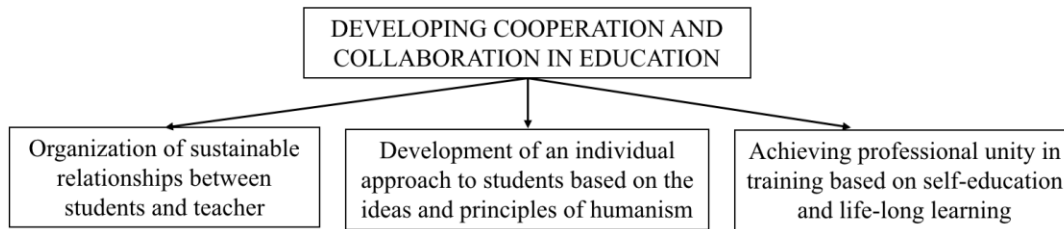
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INTRODUCTION

The widespread use of modern pedagogical and information technologies at all stages of the educational process and the introduction of innovations in the educational process pose the task for teachers to develop the skills of independent search for knowledge and their rapid development in their students. To achieve this ambitious goal, one should focus on the need to move to a quality system of school and higher education, which would have a significant innovative potential and provide all the opportunities to train personnel for a knowledge-based and innovation economy (Angeloni, 2020).

Consequently, an effective pedagogical technology allows one to quickly and successfully involve students in educational activities. More than that, an effective pedagogical technology should allow solving important educational problems, including the following: setting clear goals, decomposing the educational process, introducing high teaching standards, establishing effective communication between students and the teacher, as well as implementing modern digital technologies (Sappey and Relf, 2010; Costa, Castaño-Muñoz and Kampylis, 2020).). In addition, the organization of cooperation collaborative relations in educational activities becomes of critical importance. One can schematically reflect the key directions of developing cooperation in education as follows (Fig. 1). In such conditions and requirements, one should focus on collaborative learning technologies as a promising step in achieving the aforementioned goals.

FIGURE 1
ESTABLISHING COOPERATION IN EDUCATIONAL ACTIVITIES.



Collaborative learning technologies have been widely developed in modern world educational practice and have shown the greatest efficiency and prevalence in teaching high school and university students (Zarechnaya, 2009). Collaborative learning technologies are a way of jointly organizing relationships in a teacher-student group. Such relationships are aimed at joint activities, joint interaction, joint assimilation of knowledge in a small group or a pair, and mutual development (Tolkova, Timohina & Enova, 2019; Veretennikova, Shihova & SHihov, 2019).

Some researchers emphasize that collaborative learning is precisely a method but not a form of active teaching. Therefore, the organization of collaborative learning should be based on certain principles and basic ideas (Fedina, 2020; Sergeeva & Kubekova, 2020; Vegetti, 2019).

Strict adherence to the principles and ideas of collaborative learning acquires particular relevance in applying collaborative technologies to the training and development of preschoolers. Despite its seeming simplicity, such pedagogical technology as collaborative learning is rather difficult to use among preschoolers (Zhuravlyova, 2019).

The basic principles of collaborative learning can be formulated as a series of the following theses:

- The teacher is systematically involved in the work of groups, monitors the processes occurring in the groups, fixes emerging problems, and helps solve them.
- Distribution into groups is due to methodological expediency.
- The development of the ability to work in cooperation should be a strategic goal of the teacher.
- Problem situations for preschoolers are represented by modeling various types of interdependence. Mandrikova (2010) has formulated the following types of interdependence:
- Dependence on a single goal or a task that can only be solved in joint activities;
- Dependence on the source of information when everyone owns only part of it (e. g., different children have parts of a cut picture);
- Dependence on a single educational material (exercise or text);
- Dependence on equipment (one set of constructors, one set of pencils, or one sheet of paper);
- Uniform encouragement.

Implementing the principles of collaborative learning is complicated in the case of developing a twin situation. At the same time, it should be noted that this issue is particularly relevant due to the increase in the birth rate of twins as a result of the widespread use of reproductive technologies (Malyshkina, Pesikin & Kuligina, 2019; Nechaev, Ejberman & CHernenkov, 2020).

A twin situation determines the development of the personality of twins at various stages of adulthood (Bell & Saffery, 2012; Cassell, 2011). A twin situation is a unique social developmental situation that provides a number of advantages and, at the same time, difficulties (Buchwald et al., 2014; Chiarella, Tremblay, Szyf, Provencal & Booi, 2015). Its advantages include the presence of a permanent partner for play or communication, which is essential in preschool age (Craig, Calais-Ferreira, Umstad, & Buchwald, 2020; Klein, 2003; Treloar, 2003). As a leading type of activity in preschool age, play prepares children for entering educational activities and developing thinking, imagination, and arbitrary behavior (Hanova & Vyalova, 2020; Yakshina, 2020).

In the process of joint interaction, twins form a unique environment that promotes special language development, which differs from the speech development of single-born children (D'haeseleer, Geenens, Parmentie, Corthals & Van Lierde, 2016). Moreover, many factors of the development of communicative competence are innate (Rice, Zubrick, Taylor, Hoffman & Gayán, 2018; Vedzhetti, 2018). The twin situation determines the relationship between speech skills, self-awareness and social competence (Hayashi, Mikami, Nishihara, Maeda & Hayakawa, 2014).

The formation of the personal identity of preschoolers separately from their twin siblings is the main difficulty of a twin situation (Miliora, 2003). In addition, if one of the twin pairs has less developed communication skills, then this can be expressed in behavioral aspects, such as aggression, impulsivity, irritability (Thorpe & Gardner, 2006; Vilenskaya, 2019). And negative experiences (stress, anxiety, depression) tend to be redistributed from one member of a twin pair to another (Kendler & Gardner, 2014; Davey et al., 2016).

Some interrelated external and internal factors determine the development of twins at each age stage (Boomsma, Busjahn & Peltonen, 2002). The external factor is the social situation of development, in which two children are simultaneously at the same stage of physical and mental development (Bacon, 2005; Holodova & Loginova, 2020). The internal factor is children's attitude to such a social situation of development. This attitude can be different. Twins can compete and complement each other's weaknesses by achieving a common goal of activity (Cassell, 2011).

The principles of collaborative learning teach preschoolers to work in a team, cooperate, and get a joint result (Rakhimov, 2019). By applying collaborative learning technologies, we achieve the increased effectiveness of training, the development of motivation, positive self-attitude, and the ability to view the situation from the point of view of another person, cooperate, and accept oneself and the others. Understanding and a positive attitude towards oneself and others create the foundations for forming self-awareness and personal identity. Self-awareness is one of the leading constructs in the formation of the personality of preschoolers. Precisely at the end of preschool age, self-awareness develops into a stable integral system that influences the formation of the internal position and readiness of preschoolers for schooling. Collaborative learning develops flexibility and the ability to adapt to new things, which contributes to the formation of arbitrary behavior and self-regulation (Shmatko, 2010).

This paper aims to assess the effectiveness of using collaborative learning technologies for the development of self-awareness in preschool twins.

Research objectives:

- At the ascertaining stage, to identify the features of the relationship in the dyad of twins;
- To evaluate the features of the interaction of twins in a series of problematic situations;
- Develop and implement a program of psychological and pedagogical support for the development of self-awareness of preschool twins;
- Evaluate the effectiveness of the formative stage of the experiment.

MATERIALS AND METHODS

One hundred preschool twins participated at the ascertaining stage of the experiment with the written consent of their parents. The average age of the twins was six years and three months. At the same time, only sixteen preschoolers participated in the formative stage of the experiment, which consisted of testing collaborative technologies in the psychological and pedagogical support of preschool twins. Among them, there were eight girls and ten boys – two pairs of opposite-sex twins and six pairs of same-sex twins (three pairs of sisters and three pairs of brothers).

The ascertaining part of the experiment included the structured interview method (Cassell, 2011) and standardized observation of the joint performance of the task of the dyad of twins.

The structured interview method was used to assess the features of the relationship in the dyad of twins. This method included an assessment of the following parameters:

- Intimacy;

- Attachment;
- External difference;
- Differentiation;
- The desire to remain undifferentiated;
- Individual confidence.

The interview was conducted individually with each child.

The observation included an expert assessment of some empirical indicators on a scale from one to five. The experimenter's assistant not involved in the activity assessed these indicators. The problem situation presupposed performing three series of tasks using the Kohs block design test by a pair of twins. Each of the preschool children had six blocks. Their task was to use these blocks and replicate the picture shown. The picture could be replicated from four blocks in the first series, nine blocks in the second series, and sixteen blocks in the third series. The first series demonstrated the choice of joint or individual activities, while the second series showed the quality of the formation of joint activities in a pair of twins and their ability to cooperate. As for the third series, it involved turning to an adult for help to solve a problem. After completing the assignment, the children were interviewed and asked to assess the results of their joint activities.

Since the experimenter was actively involved in the activity, the assessment of empirical indicators was performed by the assistant.

Empirical indicators were as follows:

- Preference for individual activities;
- Efficiency of activities;
- Domination in a pair;
- Use of personal pronouns *I* and *we* in speech;
- Self-assessment of the activity results;
- Emotional reactions throughout the experiment;
- Orientation towards cooperation;
- Rivalry orientation;
- Request to a peer and an adult for help.

The formative stage of the experiment included an empirical assessment according to the above empirical indicators of the process and the result of the joint performance of the task by the twins before and after participation in the formative experiment. The formative experiment was based on a program of psychological and pedagogical support for the development of self-awareness of preschool twins, elaborated using collaborative learning.

The effectiveness of the implemented program was assessed using the methods of mathematical statistics.

The method of mathematical and statistical data processing – Mann–Whitney *U*-test – was performed using the SPSS Statistics 23.0.

RESULTS

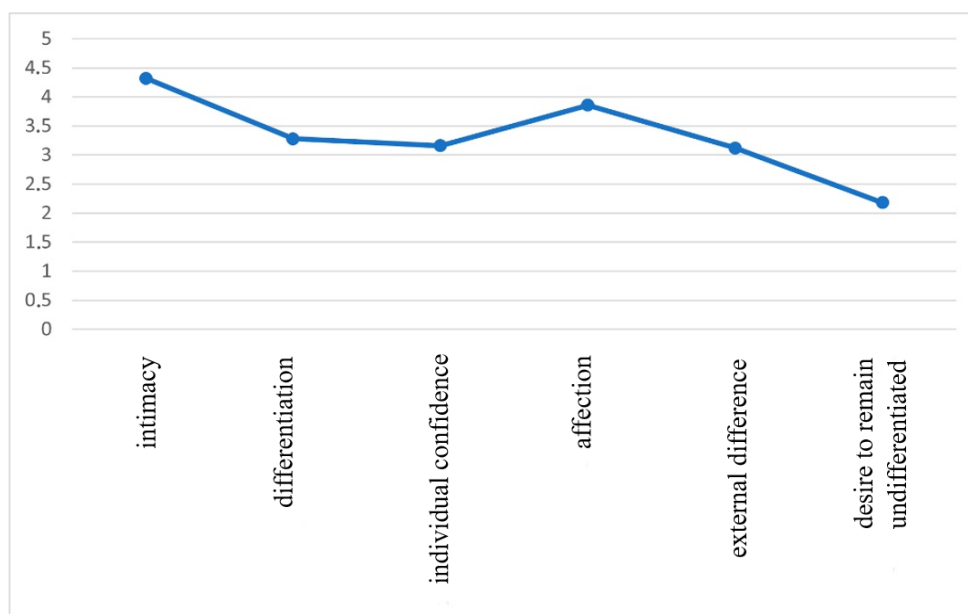
The results of the Cassell questionnaire are presented below. We have analyzed the average values for the parameters of intimacy, affection, external difference, differentiation, desire to remain undifferentiated, and individual confidence in preschool twins.

The analysis has shown that preschool twins are characterized by a high level of affection and intimacy since they enjoy spending time together and have positive emotions for each other and the need for joint activities (Fig. 2) (Cassell, 2011). At the same time, they are characterized by low results on the *desire to remain undifferentiated*, which indicates the need for twins to have their individuality and identity. *Individual confidence* is also at a relatively low level, which indicates that twins feel uncomfortable being separated from each other.

The results of standardized observation have shown that preschool twins have some features that should be considered when organizing collaborative learning.

The analysis has shown that the twins are more willing to choose an individual way of completing the task (Fig. 3): they more often replicated two pictures from their own blocks in the first series of the experiment, took the blocks from each other in the second series, and had difficulties with the task of the third series in which they needed to ask an adult for help. Twins are more competitive than cooperative. Despite this, the pronoun *we* is more often used in speech than the pronoun *I*. Even working individually, the twins responded, “we did it well” and “<...> it is because we are capable.” *Self-assessment of the activity results* is slightly higher than three points, which indicates the dissatisfaction of preschoolers with the results of their own activities.

FIGURE 2
EVALUATION OF RELATIONSHIPS IN THE TWIN DYAD BASED ON THE RESULTS OF A STRUCTURED INTERVIEW



At the next stage of the research, we developed a program of psychological and pedagogical support for the development of self-awareness in preschool twins, which was based on collaborative learning technologies.

The program included eight sessions (25 minutes each) for two months. The first and last sessions were diagnostic.

The sessions aimed to develop the skills of cooperation in preschoolers for performing joint tasks. Each session included studying one of the following six topics: “My family,” “The house I live in,” “I am what I eat,” “My toys,” “My friends,” “My hobbies.”

For completing the assignments, preschoolers were divided into groups of two people. Four topics and two diagnostic sessions involved working with their twin siblings, and two topics (*I am what I eat* and *My friends*) included working in groups of four people with twins from other couples.

This change of pairs allowed children to develop communication skills and us to identify problems in the interaction of twins in a pair and with other children. The information received served as material for group discussions and the development of the reflection of preschoolers.

The work on the topic occurred in productive and playful activities and necessarily ended with the presentation of the results of the work and a group discussion.

Problematic situations represented by interdependence and resolved only in collaborative activities became special conditions for developing cooperation skills. Equipment dependency is also such a situation. The twin pair always received one set of pencils, one pack of plasticine, or one sheet of paper. The goal of the assignment could be achieved only in collaborative activities, and the presence of a large number of pairs gave rise to a situation of rivalry not within the twin dyad but with another pair of twins and served as an additional motivation for the development of cooperation skills in the pair.

FIGURE 3
EVALUATION OF THE RESULTS OF THE ASCERTAINING EXPERIMENT IN THE TWIN DYAD

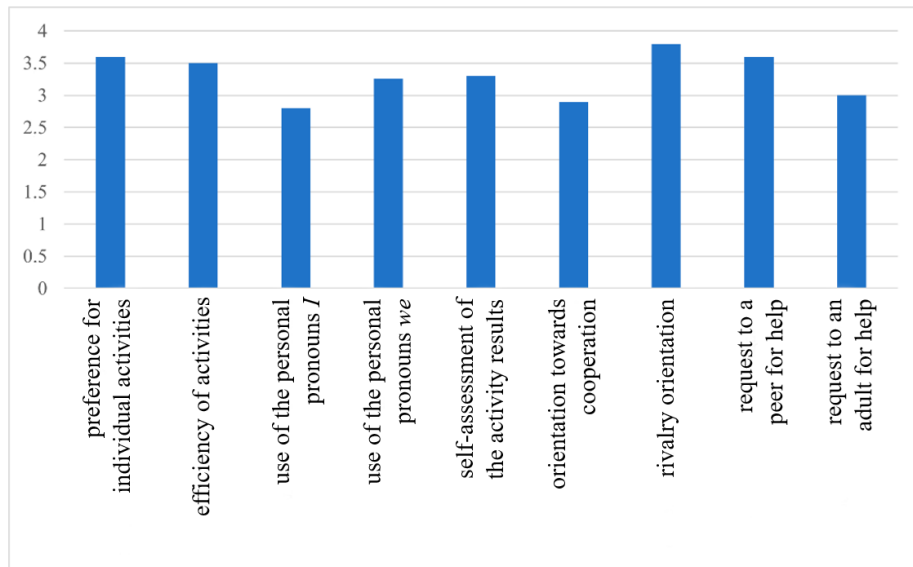
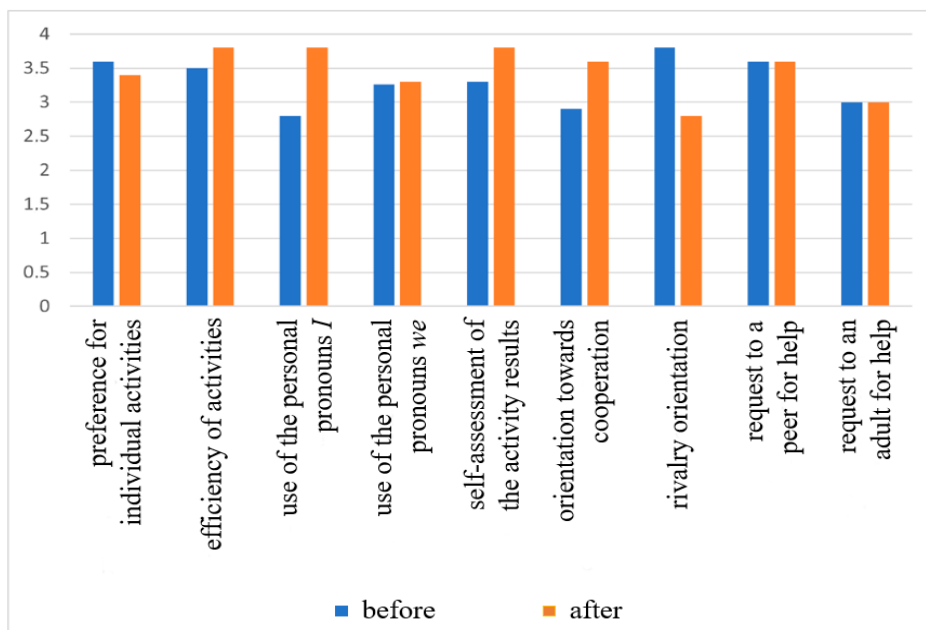


FIGURE 4
EVALUATION OF THE RESULTS OF THE FORMATIVE EXPERIMENT



The evaluation of the effectiveness of using collaborative learning technologies in psychological and pedagogical support of twins was performed by comparing the results before and after the application of the technology with the help of the method of mathematical statistics of the Mann–Whitney *U*-test.

The analysis of the results (Fig. 4) has shown a positive trend in the following indicators:

- Use of the personal pronoun *I* ($Z = 2.12$; $p = 0.02$);
- Self-assessment of the activity results ($Z = 1.98$; $p = 0.03$);
- Orientation towards cooperation ($Z = 1.89$; $p = 0.02$).

Besides, the result analysis has demonstrated negative dynamics in terms of rivalry orientation $Z = 1.89$; $p = 0.02$).

Preschool twins participating in the formative experiment with the use of collaborative technologies began to use the pronoun *I* more often, evaluate the results of their own activities positively, and be more focused on cooperation and less on the competition.

DISCUSSION

Technologies of joint learning are represented by a common goal, joint interaction, mutual processing and assimilation of new knowledge, mutual development. According to I.A. Zhuravleva, the application of joint technologies to the education and development of preschoolers is of particular relevance (Zhuravleva, 2019). We share the author's opinion in this position and determine the uniqueness of this study in the possibility of using technologies of joint activity in preschool age, since before that, materials on joint activities of schoolchildren and students were presented in scientific research.

Cassell points out that the twin situation is crucial in the development of the personality of twins at various stages of adulthood (Cassell, 2011). Bell's research focuses on the fact that studying twins gives us information about the influence of potential factors on the development of a twin's personality (Bell et al., 2012). Thus, co-educational technologies are a special condition for the development of a preschooler's personality. Chiarella points out the importance of the influence of the early environment on the mental health of children (Chiarella et al., 2015). In this context, the twin situation is a unique social situation of early development, which provides a number of advantages and difficulties at the same time.

An important advantage, according to Klein and Craig, is the presence of a permanent partner for playing or socializing, which is very important in preschool age (Craig et al., 2020, Klein, 2003). We also note that in addition, a positive effect has been revealed in the development of self-awareness of preschool-age twins. Paradoxically, it is only through association with others that a person learns about himself, his peculiarities.

In the process of joint interaction, twins form a unique environment that promotes special language development, which differs from the speech development of single-born children (D'haeseleer et al., 2016). As a result of our research, it was determined that the use of co-learning technologies positively influenced the use of the pronoun "I" in the speech of preschool twins, which indicates a positive relationship between co-learning technologies and the development of self-awareness and identity of a preschooler. These results are partly reflected in Hayashi's scientific work, where the author determines the relationship between speech skills, self-awareness features and social competence in twins (Hayashi et al., 2014). Moreover, many factors of the development of communicative competence are innate (Rice et al., 2018).

The main difficulty of the twin situation is the formation of a preschooler's personal identity separately from his twin (Miliora, 2003). During the experiment, at the ascertaining stage, it was repeatedly observed that preschool-age twins tend to use the pronoun "we", which is determined by difficulties in developing self-awareness.

In the works of Thorpe and G.A. Vilenskaya, an aspect related to the manifestation of difficulties in behavior in preschool children is revealed (Thorpe et al., 2006; Vilenskaya, 2019). In the course of the study, we noted that if one of the twin couples has less developed communication skills, then this can be expressed in aggressiveness, impulsivity, irritability. Also, among the negative aspects of the twin situation, one can note the ability to transition from one twin to another of various negative experiences (stress, anxiety, depression) (Kendler et al., 2014; Davey et al., 2016).

The results of this study have been tested and proved to be effective for the development of cooperation skills and the development of positive self-esteem and general assessment of the results of their own activities.

Rakhimov and Shmatko believe that the implementation of the principles of co-education teaches preschoolers to work in a team, cooperate, get a joint result, develops flexibility, the ability to adapt to new things, which contributes to the formation of arbitrariness of behavior and self-regulation (Rahimov, 2019; Shmatko, 2010).

The use of joint technologies at preschool age requires patience from the teacher, constant involvement in the process of activity to solve problem situations and maintain the arbitrary attention of preschoolers. This is due to the peculiarities of age.

CONCLUSION

Thus, collaborative learning of preschool twins is effective only with strict adherence to the principles of collaborative learning. Dividing preschoolers into pairs is the most effective form of collaborative learning since the arbitrariness of behavior and stability of attention are not sufficiently formed at preschool age. A large number of preschoolers in a group acts as a distraction that reduces work efficiency.

When using collaborative learning technologies, the teacher is always actively involved in all ongoing processes. Moreover, it is possible to conduct training and psychological and pedagogical support in the format of paired pedagogy. In the case of using the method of paired pedagogy in combination with collaborative learning technologies, the teacher has the opportunity to demonstrate a model of behavior in a dyad.

Distribution into groups occurs according to methodological expediency. Groups can be formed in four different ways: (1) a dyad of twins; (2) same-sex twins from different families; (3) opposite-sex twins from different families; and (4) a twin and a single-born child. It is allowed to combine several dyads of twins into a group to solve individual tasks. Achieving cooperation in a group is the fundamental goal of the teacher, who teaches the twins how to interact with each other and develops communication skills and the ability to negotiate, seek help, and listen to a communication partner. The teacher helps resolve conflicts that arise in the group, thereby demonstrating the advantage of cooperation over rivalry.

At each session, the teacher poses a problematic situation for preschoolers, which can be solved only in cooperation and mutual assistance and allows preschool twins to form their identity and develop their self-awareness. The results of the study may be useful to teachers-psychologists of educational institutions for the purpose of psychological and pedagogical support of twins of preschool age. The use of collaborative learning technologies will increase the effectiveness of communication in the gemini dyad, form the skills of cooperation of preschoolers and will contribute to the development of self-awareness of the individual.

Further research may be related to the evaluation of the effectiveness of the use of coeducation technologies in pairs of di- and monozygotic twins of senior preschool and primary school age. Longitudinal studies of the dynamics of the development of cooperation skills in twins with the use of collaborative learning technologies are also a promising direction for further research.

Buchwald in a number of works reflects the activities of the international network of Twin Registries (INTR), which is aimed at developing scientific cooperation and promoting twin research on a global scale through work on expanding the resources of twin registries around the world and providing them to researchers (Buchwald et al., 2014). The results of this study can also be useful to the world scientific community in terms of expanding the methods of teaching preschool twins.

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