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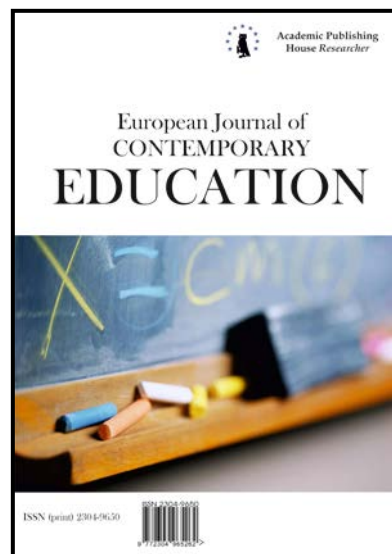
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## **Geometrical similarity transformations in Dynamic Geometry Environment GeoGebra**

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### **Abstract**

The subject of the article is usage of modern computer technologies through the example of interactive geometry environment Geogebra as an innovative technology of representing and studying of geometrical material which involves such didactical opportunities as visualization, simulation and dynamics. There is shown a classification of geometric similarity transformations of the plane, computer tools of interactive geometry environment GeoGebra which are used for realization of similarity transformations. It is illustrated an opportunity of usage of these represented tools while studying of concerns and properties of geometric transformations, theorem proving, solving of construction tasks.

**Keywords:** dynamic mathematics software, interactive geometry environment GeoGebra, computer tools, geometric similarity transformations.

### **Introduction**

During the stage of education modernization in Russia questions of usage of information and communication technology are becoming very actual. Necessity of computer support in the educational process is defined the requirements of the federal educational standard of the general education:

*generation and developing of competence in the area of use of information and communication technology (ICT- technology) [1; 7].*

In the modern society ICT-competence is considered as one of basic competences of a school graduate since it is represented as *is the capacity* to use of information and communication technology for information search, its processing, estimation and transmission, sufficient to successfully life and work in the environment of modern society.

Modern information and communication technology enable to involve the pupil in various kinds of activity: research, creative, design and others opening new possibilities for generation ITC-competence. For this reason the main pedagogical task of education at the modern stage with usage of ITC consists not only in the delivering of current knowledge but in creating of conditions for getting it independently, for experience, "opening" new knowledge, for updating of pedagogical technology under the conditions of active usage of ICT means.

Interactive means of education on the base of information and communication technology which include dynamic geometry environment (DGE) or systems of dynamic geometry (SDG) are widely spread in modern school.

All dynamic geometry programs variety can be divided into two kinds:

- two-dimensional geometry programs (2D), for example, Cabri Geometry, The Geometer's Sketchpad (the Russian version is "Living mathematics"), GeoGebra, GeoNext;
- three-dimensional geometry programs (3D), for example, Archimedes Geo3D, Geometria, Geogebra (from version 5.0).

Dynamic geometry environment have a range of advantages comparing with traditional educational technologies, among them are the following:

- ✓ attraction of computer tools to performance of constructions while saving with pupils right imagination about geometrical generation methods;
- ✓ making of dynamic drawings with an opportunity of further research work;
- ✓ wide range for active independent work of pupils;
- ✓ usage of dynamic geometry programs at school and at home in any time.

Among didactic opportunities of dynamic geometry environment as information technology we emphasize the following:

- ✓ *visualization* – a pictorial rendition of educational information about geometric objects which develops "active mathematical seeing" of objects and their features [2];
- ✓ *simulation* –experimental observing the behavior of geometric objects and detection of unknown features and facts [3];
- ✓ *dynamics* –a realization moving effect of an illustrative object with computing means [4].

Thus, dynamic geometry environment is represented as an innovating type of educational product which involves didactical opportunities new in quality comparing with traditional illustrative means. When working in dynamic mathematics software, on the one hand, a pupil uses a *new innovating technology of studying* the material, and on the other, a *combined information processing technology* which is usual and natural for the modern pupil [5]. Therefore learning of dynamic geometry programs opportunities, their methodic tracking, applying in the educational process are interesting for many researchers.

**Actual investigations analyzing.** Analyzing of scientific and methodological literature regarding the improvement of mode of an instruction in mathematics from the point of view of usage in the educational process means of information technology allows to say that a great amount of methodological works are devoted to this question. Usage of dynamic geometry environment in the educational process is one of the actual directions of an investigating activity of scientists and instructors:

- ✓ creation of models and training materials in the environment «Mathematic constructor» [6];
- ✓ developing of flexibility of thinking through the organizing of creative workshops in the environment «Mathematic constructor» [7];
- ✓ developing of creativity of pupils while teaching mathematics in 5-6 forms using dynamic geometric environment [8];

- ✓ usage of the dynamic geometry environment GeoGebra in different stages of work with a theorem [9];
- ✓ usage of dynamic geometry GeoGebra as a means of computer simulation [10];
- ✓ functional opportunities GeoGebra in the context of educational and methodic support [11] etc.

Dynamic environments, in particular GeoGebra, have a wide range of tools which enable to use such opportunities as visualization, simulation and dynamics while studying geometric transformations in a plane and space. In school mathematic workbooks there is a little place for geometric transformations in a plane and space, besides with a small quantity of tasks and minima of visualization.

Incidentally it should be mentioned “Geometric Transformation” is one of the key, interesting and the most beautiful themes of geometry which allows developing “visual thinking”, spatial perception and geometric literacy of pupils. Usage of concepts and features of the studied theme simplifies a theorem proving and opens a new method of the solution of many tasks on construction.

**Research objective:** to show an opportunity of environment GeoGebra tools using while studying geometric similarity transformations with the aim of visualization of educational information about studied concepts and developing of “active mathematic vision” of objects and their features.

### **Discussion**

Dynamic geometry environment GeoGebra is freely distributed software which has a Russian version. The main feature of GeoGebra is a double representation of objects: in the form of algebraic and geometric models (**geometry+algebra**); for each of them is given an individual window thereby it is emphasized an unbroken link of different parts of mathematics.

The list of computing instruments in the dynamic geometry GeoGebra includes standard set of tools which enables to create main geometric objects (a point, a line, a circle, a vector, a polygon, an angle) and another tools realizing additional operations on geometric objects (segment division in halves, angle division in  $n$  equal parts, measurement of segment length, measurement of the angle and etc.) Lets pay attention to the tools of the environment whereby one can study and use geometric similarity transformations for problems solving.

In modern school programs there is too little place given to the concept of geometric transformation: pupils are taught definitions of such transformations as a turn, a parallel shift, symmetries. This material is studied at the end of the 9 form for short, with minima of visualization and similarity transformations are regarded only during studying of triangles similarity features [12].

Thus, similarity transformation or analogy is the transformation from one figure to another when the distance between two points is changing into the same number of times that is called the similarity coefficient. If the similarity coefficient is equal to one, the transformation is called motion [Fig. 1.].

French mathematician (geometer) of 19-th century Mishel Charl enunciated the classification of motions: *Any motion is either the parallel transfer or the symmetry, or the composition of the symmetry and the transfer into the vector parallel to the symmetry axis (the last kind of symmetry is called slipping symmetry)*[13].

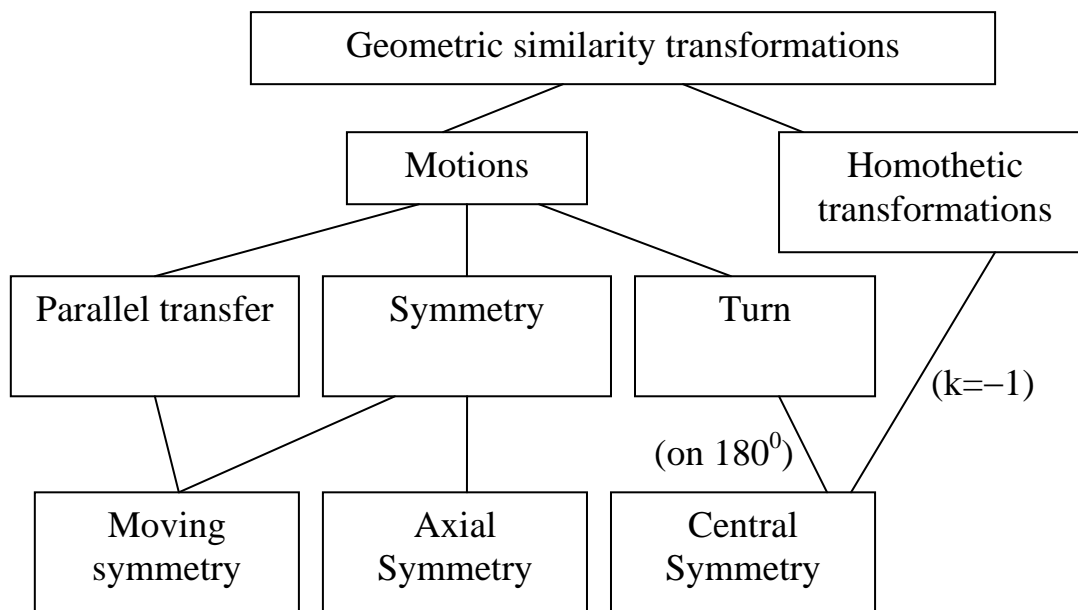


Fig. 1. Geometric similarity transformations

Let us introduce the classification of similarity transformations in a plant after main invariants. The *invariant* of the transformations multitude is called a figure characteristic saved in the course of influence on it any transformation from the pointed multitude.

Transformations	Saves distance	Saves angles	Kinds
Motions	yes	yes	turn, transfer, central and axial symmetry
Similarities but no motions	no	yes	Homothetic transformations

Dynamic geometry environment can be used not only for the illustration of studied geometric transformations but for studying their characteristics, for the theorem proving, for solving construction problems thanks to the environmental tools.

Computer tools	Concept of Motion
Reflection regarding to the line	Axial symmetry is a motion regarding to the line when a figure is mapped into itself
Reflection regarding to the point	Central symmetry is a motion regarding to the point when the figure turns into itself
Turn around the point	Motion around the point O through the angle $\alpha$ , when every point M turns into the same point $M_1$ , that is $OM=OM_1$ and the angle $MOM_1=\alpha$
Parallel transfer along the vector	Motion to the vector $\vec{a}$ , when every point M turns into the point $M_1$ in this case the vector $\overrightarrow{MM_1} = \vec{a}$ .
Homothetic transformations regarding to the point	Homothetic transformations with the centre in the dot O and coefficient $k \neq 0$ is a geometric transformation which turns any point A into the same point A', that is $\overrightarrow{OA'} = k \cdot \overrightarrow{OA}$

**Geometric Transformations –Motions**

Motions are connected with the concept of figures equality (congruence): two figures F and G on the plane  $\alpha$  are named equal if there is a motion of this plane, which turns the first figure into the second.

**Axial Symmetry**

Two points A and A1 are called symmetric regarding to the line  $a$  if this line passes through the middle point of a segment AA1 and is perpendicular to it. Two figures F and F1 are called symmetric regarding to the line if every point of one figure has a symmetric point of another figure.

**Example 1.** There is a polygon ABCDE and a line  $f$ . Make a figure which is symmetric to the given one regarding to the line  $f$ . Prove symmetry of figures using the definition. Show that axial symmetry maintains distances but does not change the orientation that is the direction of sense of rotation into opposite. [Fig. 2].

Steps of construction	Computer tools
Construct a polygon ABCDE	A polygon
Construct a line passing through two points	A line
Construct mirror reflection of the polygon regarding to the line	Reflection regarding to the line
Link tops of the polygon ABCDE together with tops of the polygon A'B'C'D'E'	A segment
Point middles of the made segments	Middle or centre
Measure sizes of angles between segments and the reflection line	Angle

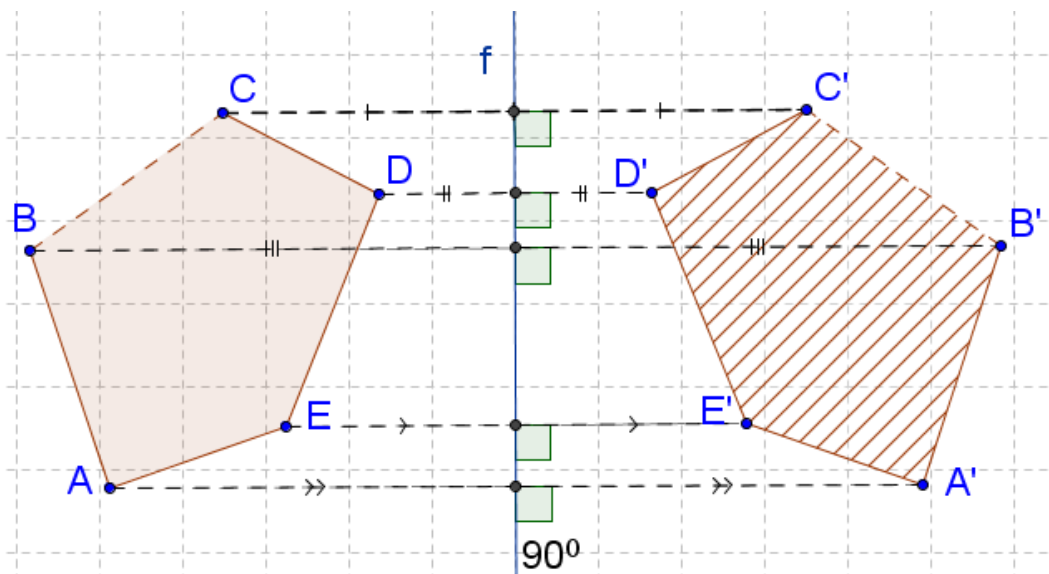


Fig. 2. Symmetry regarding to the line

**Example 2.** Equal circles  $S_1$  and  $S_2$  internally tangent the circle  $S$  in points  $A_1$  and  $A_2$ . Any point  $C$  of the circle  $S$  is connected by segments with points  $A_1$  and  $A_2$ . These segments cross  $S_1$  and  $S_2$  in points  $B_1$  and  $B_2$ . Prove that  $A_1A_2 \parallel B_1B_2$  [13; 362].

**Solution.** When making the drawing be sure in the truth of the statement  $A_1A_2 \parallel B_1B_2$  [Fig. 3].



Steps of construction	Computer tools
Make a circle S	Circle on the centre and radius
Sketch a diameter of the circle AB having chosen it as an axis of symmetry	Segment
Put point A <sub>1</sub> on the circle S	Point on the object
Sketch a tangent line to the circle S in the point A <sub>1</sub>	Tangent
Make a circle S <sub>1</sub> passing through the point A <sub>1</sub>	Circle through the centre and the point
Put the point A <sub>2</sub> and the circle S <sub>2</sub> which are the mirror reflection regarding the diameter regarding AB the point A <sub>1</sub> and the circle S <sub>1</sub>	Reflection regarding to the line
Choose any point C on the circle S	Point on the object
Link the point C by segments with points A <sub>1</sub> и A <sub>2</sub> , mark crossing points of segments made with circles S <sub>1</sub> and S <sub>2</sub> through B <sub>1</sub> и B <sub>2</sub>	Segment
Link points A <sub>1</sub> и A <sub>2</sub> with the segment	Segment
Make the parallel line A <sub>1</sub> A <sub>2</sub> passing through the point B <sub>1</sub> . Make sure that the point B <sub>2</sub> belongs to the made line	Parallel line

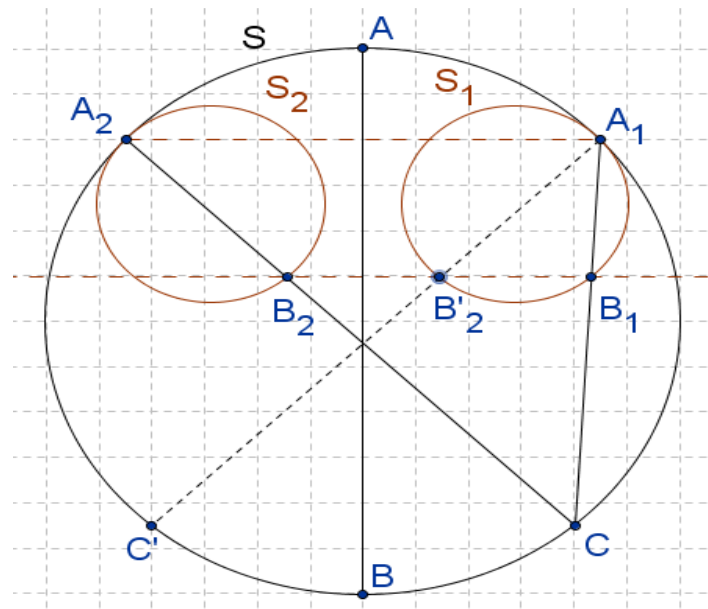


Fig. 3. Solution of the problem using the symmetry

**Proof.** Lets put points C' and B'<sub>2</sub> symmetric to points C and B<sub>2</sub> in relation to a diameter AB using the tool “Reflection regarding to the line”. Since points A<sub>1</sub> and A<sub>2</sub> are symmetric regarding the diameter and the point C' is symmetric to the point C regarding to the same diameter, then  $A_1A_2 \parallel CC'$ .

Circles S and S<sub>1</sub> are homothetic with the centre of homothetic transformations in the point A<sub>1</sub>. The line B<sub>1</sub>B'<sub>2</sub> turns into the line CC', this means that lines are parallel. Since the circle S<sub>1</sub> is symmetric to the circle S<sub>2</sub> regarding to the diameter AB, the point B'<sub>2</sub> is symmetric to the point B<sub>2</sub>, the point C is symmetric to the point C', then  $B_2B'_2 \parallel CC'$ , hence points B<sub>1</sub>, B'<sub>2</sub>, B<sub>2</sub> lay on one line B<sub>1</sub>B<sub>2</sub> which is parallel to the line CC'.

We get  $A_1A_2 \parallel CC'$  и  $B_1B_2 \parallel CC'$ , this means,  $A_1A_2 \parallel B_1B_2$ .

We see that tools of dynamic geometric similarities are convenient means of searching the problem solution result but do not free from proving of the obtained result especially by solving proof problems.

**Parallel transfer**

Parallel transfer on the vector  $\vec{a}$  is called a mapping into itself when every point M is transferred into the point M<sub>1</sub>, that is the vector  $\overrightarrow{MM_1} = \vec{a}$ .

**Example 3.** It is given a triangle ABC and a vector  $\overrightarrow{DE}$ . Make a figure which will come out from the initial one through a parallel transfer onto the vector  $\overrightarrow{DE}$ . Show that the parallel transfer saves distances and an orientation. [Fig. 4].

Steps of construction	Computer tools
Make the triangle ABC	Rigid polygon
Mark the vector DE	Vector
Make a figure through a parallel transfer of the triangle ABC onto the vector DE	Parallel transfer onto the vector
Mark vectors from points A, B, C which are equal and equally directed with the vector DE	Mark the vector
Define vectors length	Distance and length

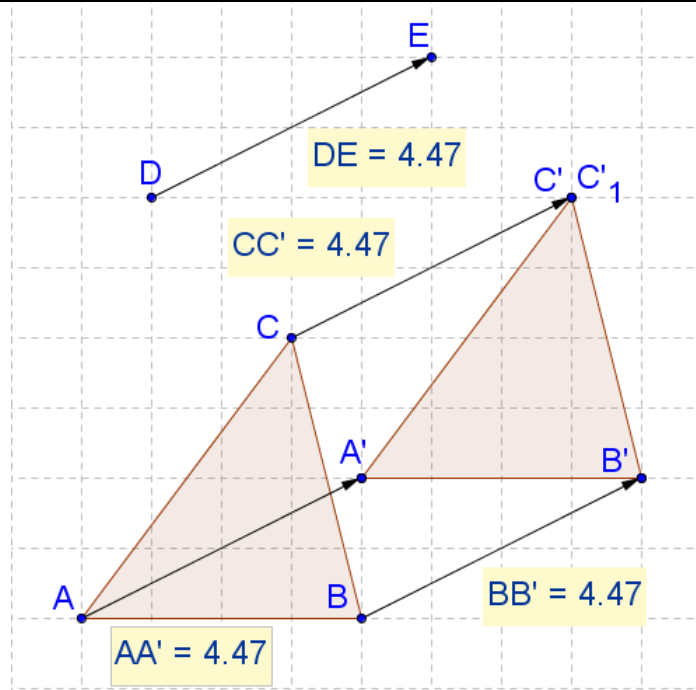


Fig. 4. Parallel transfer

**Example 4.** In the trapezium ABCD sides BC и AD are foundations, point M is a crossing point of angles bisectors A and B, N is a point of angles bisectors C and D [Fig. 5]. Prove that  $2MN = |AB + CD - BC - AD|$  [13; 346].

Steps of construction	Computer tools
Make a trapezium ABCD	Polygon
Make angles bisectors A и B, C и D	Angles bisector
Mark a crossing point of bisectors A and B like M, C and D like N	Point on the object
Sketch a perpendicular line BC through the point M, mark a crossing point like E	Perpendicular line Point on the object
Make a circle which touch with sides AB, BC and AD, with the centre in the point M, passing through the point E	Circle on the center and a point
Put a triangle CND parallel to foundations so that N' will coincide with the point M and the side C'D' will be touch with the circle	Parallel transfer onto the vector
Find length of trapezium sides and the segment MN	Distance and length

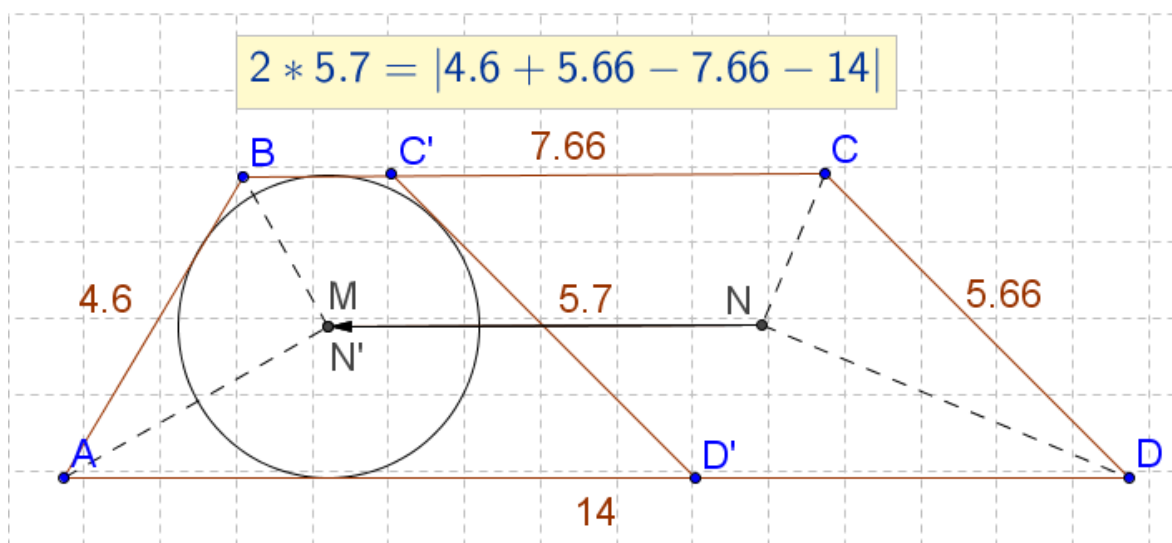


Fig. 5. Solving of problems with usage of parallel transfer

**Proof.** For the described trapezium ABCD the following congruence is true  $AB+C'D'=AD'+BC'$ , this can be written like  $2MN'=|AB+C'D'-AD'-BC'|$ . If to adjoin to the left part of the congruence  $2N'N$  and to the right one  $-CC'+DD'$ , then we get a statement which we must prove.

**Parquet**

Parquet on the plane is the filling of the plane with polygons when any two polygons have either a common side or a common top or do not have any points in common.

Parquets on the plane is a wonderful creative material for involving pupils into an interesting cognitive activity. The easiest kind of the parquet is such a parquet where a plane is filled with figures thanks to a parallel transfer, for example, there is a task to make the parquet from triangles equal to the given triangle [Fig. 6].

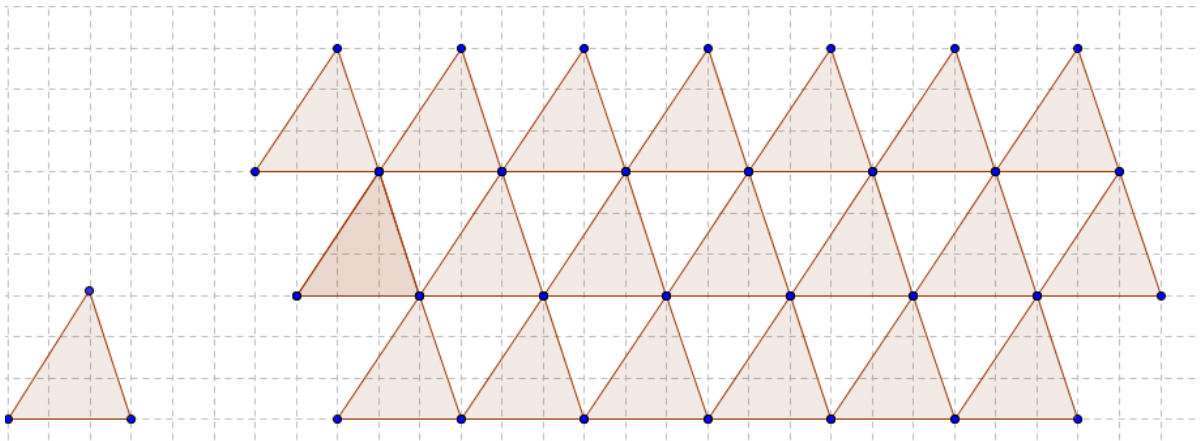


Fig. 6. Parquet

**Turn**

Turn of the plane around the point  $O$  on the angle  $\alpha$  is called a mapping of the plane into itself when every point  $M$  is mapped into such point  $M_1$ , that  $OM=OM_1$  и  $\angle MOM_1 = \alpha$ .

**Example 5.** It is given a circle. Make a figure which is made from the original one through the turn into the angle of  $90^\circ$ ,  $180^\circ$ ,  $270^\circ$  around the point. Show that the turn saves distances [Fig. 7].

Steps of construction	Computer tools
Make a segment $AB$	Segment
Make a half circle through points $A$ и $B$	Half circle through two points
Make a turn around point $A$ of a half circle and a segment into angle $90^\circ$ , $180^\circ$ , $270^\circ$	Turn around the point
Measure sizes of angles between segments $AB$ and $AB_1$ , $AB_1$ and $AB_2$ , $AB_2$ and $AB_3$	Angle
Measure lengths of segments $AB$ , $AB_1$ , $AB_2$ , $AB_3$	Distance or length

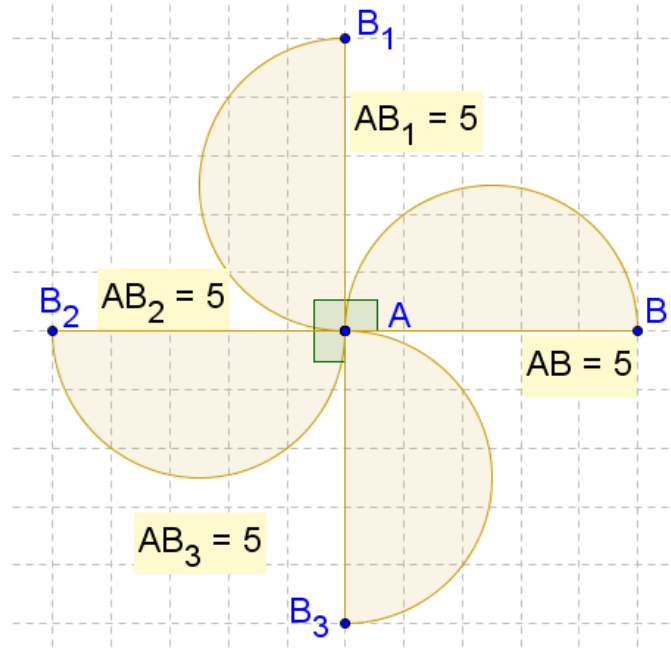


Fig. 7. Turn

### Central Symmetry

Two points  $A$  and  $A_1$  are called symmetric regarding to the point  $O$  if  $O$  is a middle of the segment  $AA_1$  (point  $O$  is a symmetry centre). A figure is called symmetric regarding to the point  $O$  if for every point of this figure another point regarding to the point  $O$  belongs to this figure too [Fig. 8].

The concept of the central symmetry is a common for such concepts like turn and homothetic transformations and enables to establish equivalence relationship between such concepts like «turn to  $180^\circ$ » and «homothetic transformations with the coefficient  $k=-1$ ».

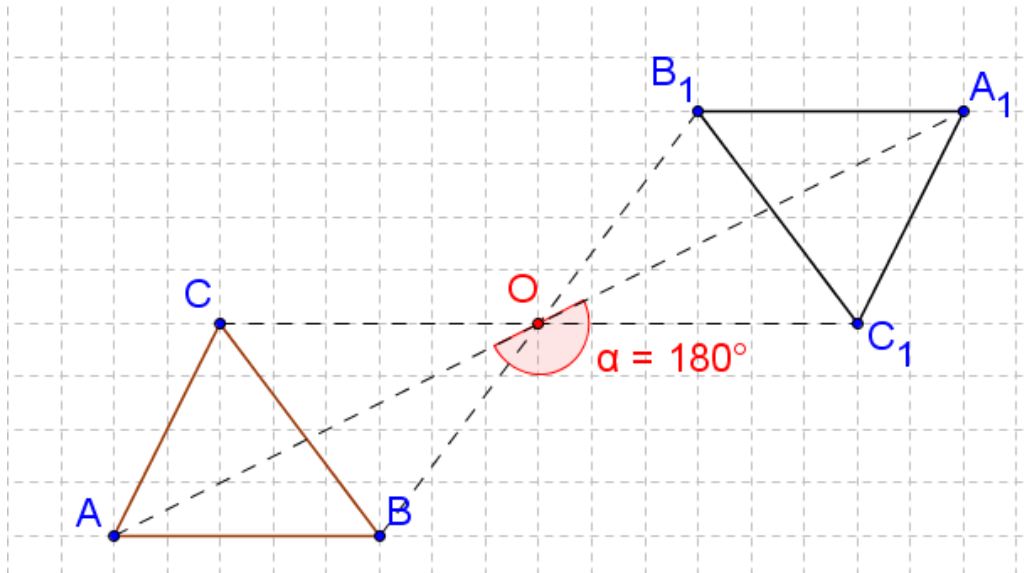


Fig. 8. Central Symmetry

### Geometric similarity transformations – homothetic transformations

Two bodies are similar if one of them is made from another through increasing or decreasing all its sizes (rectilinear) in the same ratio. The most easiest similarity transformation is *homothetic* which enables to get increased or decreased copy of the figure maintaining angles and increasing lengths to the same extent.

*Homothetic* transformation with the centre in the point  $O$  and the coefficient  $k$  different from zero is called the transformation turning every point  $A$  into the point  $A'$  lying on the line  $OA$  and satisfying the statement  $OA'=k \cdot OA$ . This definition leads to the fact that homothetic transformation maintains the shape but not sizes of the figure.

For making similar figures with the similarity coefficient  $k$  is used a tool *Homothetic transformations regarding to the point*. Firstly it is named the designed object, then the centre of the homothetic transformations and the homothetic transformations coefficient in the appeared dialog box [Fig. 9].

We note that homothetic transformations with the similarity coefficient  $k=-1$  is a central symmetry, when  $k>0$  points  $A$  and  $A'$  are lying to the one side from the point  $O$ , when  $k<0$  they are to the different sides. For studying of features of homothetic transformations depending from the coefficient it is suitable to use the tool *Slider*.

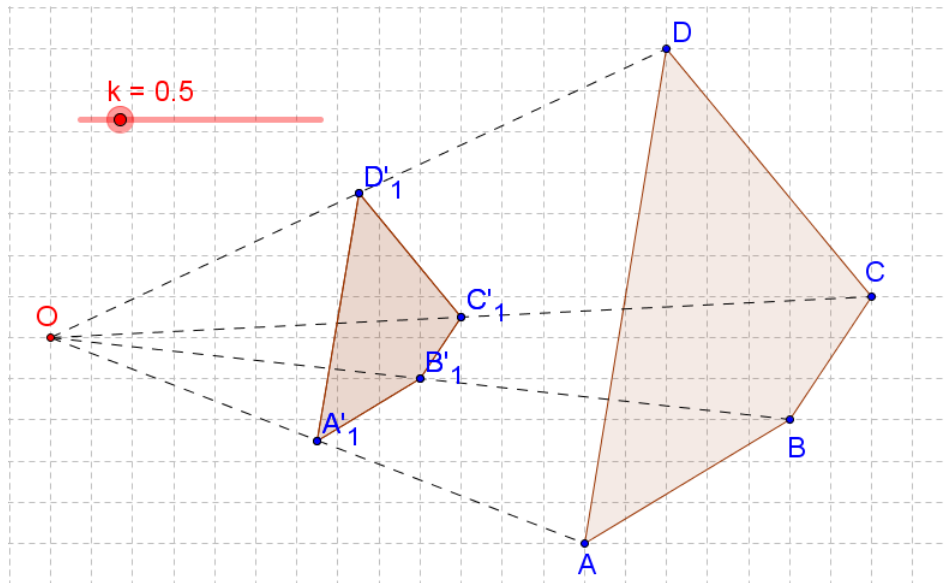


Fig. 9. Homothetic transformations

*Slider* is a computer tool containing a point-slider free moving on some line. With this point is connected some quantity which is used like a parameter. While moving the slider-box from less quantity to the bigger one, pupils note changes in features of the studied object [Fig. 10].



Fig. 10 Computer tool *Slider*

### **Compositions of similarity transformations**

There no similarity transformations in school textbooks, that is transformations which are formed as a result of consequent fulfilling of some transformations. One of this compositions is *moving symmetry*: symmetry composition regarding to the line and parallel transfer in the direction of the same line (besides taken in any order) [Fig. 11].

Set of all points where come points of some figure  $F$  while moving symmetry, makes a figure  $F'$ , appeared from the moving symmetry from the figure  $F$ .

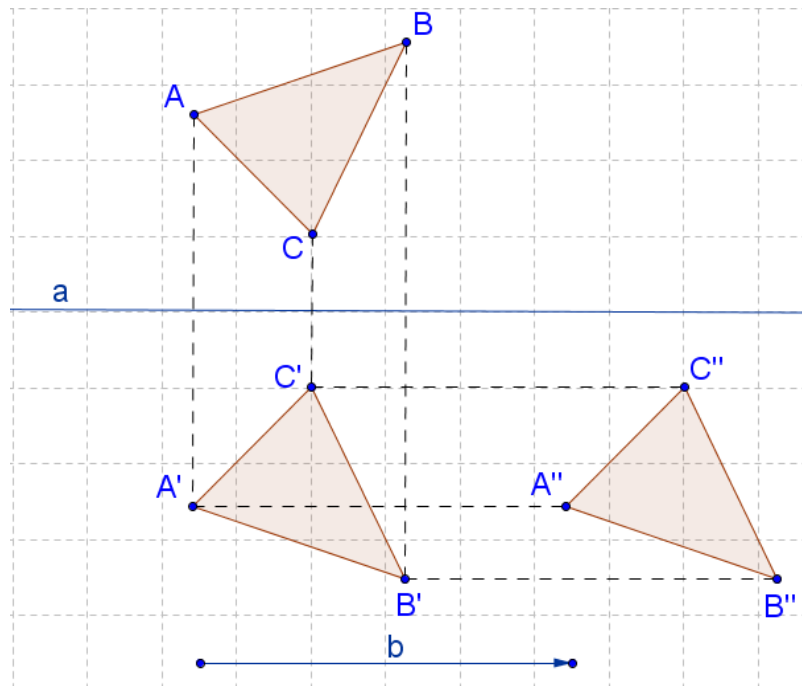


Fig. 11. Moving Symmetry

Among the transfer compositions we can distinguish the following:

✓ *turn homothetic transformations* (special similarity) is a composition of homothetic transformations with the centre in the point  $O$  and the coefficient  $k$ , different from 1, and a turn around the point;

✓ *mirror similarity* is a composition of the axial symmetry and homothetic transformations with the centre on the axe.

Studying of transfer composition and their use at the solution of tasks on the proof and construction represents a very attractive material.

### Conclusions

Dynamic geometry environment is an innovation kind of the educational product which enables to change traditional attitude to the studying of many difficult questions of geometry like it was shown in the example of geometric similarity transformations. Comparing with traditional technology dynamic geometry environment is an innovation technology of geometric material studying with new in qualities didactic opportunities among the last we can note visualization, simulation, dynamics. Presence of different tools, which includes the tools for making of geometric similarity transformations, enables to make changes into traditional process of reproducing of the above mentioned concepts, gives opportunities to the developing “active mathematic vision” of objects and their features.

### References:

1. Federal State General Educational Standard, dated 17.12.2010 г. [Electronic recourse] Минобрнауки.рф/документы/938 (date of apply: 15.04.2015)
2. Andraphanova N.V., Nasaryan D.C. Dynamic Geometry Environment as a Tool of Computing Visualization in Geometry Teaching. In the collected book Informative Technology in Supply of Federal State General Educational Standard. Materials of the International Research and Practice Conference. Elets, 2014. P. 76–80.
3. Andraphanova N.V., Zakira I.A. Support of the Investigating Activity of Pupils with tools of DGE. *Problems and Perspectives of Educational Developing in Russia*. 2014. № 30. P. 21–26.

4. Andraphanova N.V., Nasaryan D.C. Dynamic Geometric Environment as a tool of Cognitive Interest of Pupils. Problems and Perspectives of Educational Developing in Russia. 2014. № 27. P. 59–65.

5. Andraphanova N.V., Zakira I.A., Nasaryan D.C. Innovational Technology in Geometry Teaching. Person, Family and Society: Questions of Pedagogic and Psychology. 2014. № 47. P. 55–65.

6. Dubrovski V.N. Be Acquainted, “Mathematic Constructor”. *Informatics and Education*, №7 (256). 2014. P. 7–14.

7. Khramova N. N., Rodionov M.A. Development of Flexibility of Pupils’ Thinking at the Mathematic Lessons with usage of opportunities “1C Mathematic Constructor”. *Informatics and Education*, №7 (256). 2014. P. 15–21.

8. Pervushkina E.A. Development of the geometric Creativeness of Pupils of the 5-6 forms with Means of Informative Educational Technology: Dis. Can. Ped. Science. 13.00.02, 2006. 162 p.

9. Shirikova T.S. Teaching Methodic of Theorem Proof while Studying Geometry with usage of GeoGebra for Pupils of Comprehensive School. Dis. Can. Ped. Science. 13.00.02. Arkhangelsk, 2014. 250 p.

10. Ziatdinov R.A., Racuta V.M. Dynamic Geometry Environments as a Tools of Computing Modeling in the System of Modern Mathematics Education. *European Journal of Contemporary Education*, 2012, Vol.(1), №1. P. 93–100.

11. Shabanova M.V., Sergeeva T.F. GeoGebra in the System of Educational Means for Mathematics Teaching. *Informatics and Education*, №7 (256). 2014. P. 33–43.

12. Atanasyan L.S., Butusov V.F., Kadomtsev S.B. and others. Geometry 7-9 Forms. Workbook for Comprehensive Establishments. M., Prosveschenye, 2009.

13. Prasolov V.V. Tasks in Geometry on the plane. Edit. MZNMU, Moscow, 2006. 633 p.





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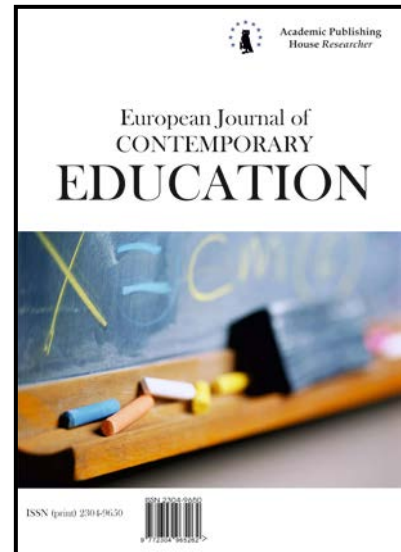
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UDC 37

### **Development of Prototype Outcomes-Based Training Modules for Aesthetic Dentistry**

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#### **Abstract**

The objective of the study is to know the essential components of Aesthetic Dentistry that will be a basis for prototype Outcomes-based training modules. Using a 5-point Likert scale, the researcher-made questionnaire assessed the different elements of Aesthetic Dentistry which are needed in the designing of the training module, the manner of presentation and the form of assessment that were needed in the training module. Statistical tools that were used for the study are percentage, frequency, weighted mean and standard deviation. The information gathered from the respondents was relevant in the development of a Prototype Outcomes-based Training Modules in Aesthetic Dentistry

**Keywords:** Aesthetic Dentistry, Outcomes-Based Education, Training Modules in Dentistry, Prototype Training Modules.

## **Introduction**

Enhancing one's appearance is an enduring trend. During the time of the Romans, white teeth were admired and ivory was used to replace missing teeth. This concept of beauty holds true in today's society. The replacement of a tooth solely for function such as mastication without the consideration of aesthetics is a thing of the past. A beautiful smile is a must nowadays. An aesthetic and pleasing smile should come hand in hand when replacing a missing, fractured or malaligned tooth in the oral cavity.

The history of Aesthetic Dentistry is said to be young because it was only decades ago that it was established. The advent of superior bonding materials prompted the birth of Aesthetic Dentistry. The new adhesive techniques made possible the restoration of anterior teeth with thin ceramic veneers and tooth-colored restoration. [1] Aesthetic Dentistry responds to the demand of patients to have a perfect smile that aesthetic doctors and dermatologists cannot deliver. The mouth is central to one's appearance. A smile is powerful. It can either make or break your look. It can communicate without words. It can also change the day of one person in a second.

Education as a field has grown to respond to the different demands of the learner. Training dentists in today's world does not stop in mere lecturing and hands-on training. Knowing the needs of the learner will help the educator properly address the issue. Moreover, assessing them in their work motivates them to learn even more. "Classroom assessment provides valuable information that allows the teacher to adapt instructional procedures to the learning needs of their students." [2] Dentists, as in any health profession, should continuously learn throughout their lifetime. In order to deliver quality dental services to the patients, dentists must undergo training in specific courses to ensure the best possible treatment will be effectively and efficiently delivered to the patient as a result of their learning experiences.

Training a dentist is different from undergraduate dental students. There is much expected from both the trainer and the trainees. There are existing programs in Aesthetic Dentistry but none of which are geared towards Outcomes-Based Education. Outcomes-Based Education, as defined by Spady, means "clearly focusing and organizing everything in an educational system around what is essential for all students to be able to do successfully at the end of their learning experiences." [3] The field of education found answers as to how a person may be trained regardless of profession. Outcomes-based education is said to focus on what the students learned rather than the inputs. This type of education is seen as appropriate by the researcher in the field of dentistry. The scarcity in Aesthetic Dentistry training modules motivated the researcher to develop one in order to benefit the researcher's training program as well as its participants. The real test in Aesthetic Dentistry is not the mere knowledge of beauty but whether the dentist successfully made a smile more pleasing.

## **Materials and methods**

The researcher obtained an approval sheet for the conduct of scientific procedures using human subjects and was signed by four IERC members. After which, the researcher sought the permission of the Dean of institution A, to conduct a study in the school. The researcher wrote a letter to the program heads of the institution B and institution C. A cover letter was then prepared for distribution to the respondents to avail them of the official information explained in the study. The researcher personally administered the questionnaire to the respondents and gave them sufficient time to answer the questionnaire.

The descriptive survey method was used in conducting the study. The respondents were 10 licensed dentists, 15 faculty members, 3 program directors and 52 participants of an Aesthetic Dentistry program held in the Philippines before October 2014. The questionnaire was used as the instrument by the researcher in determining the elements of Aesthetic Dentistry which became the basis for designing a prototype Outcomes-based training modules.

The main data gathering instrument was the survey questionnaire which consisted of the following:

1. the different elements of Aesthetic Dentistry which are needed in the designing of the training modules;
2. the manner of presentation;
3. the form of assessment that will be needed in the training modules; and
4. the training modules for Aesthetic Dentistry.

Part I dealt on the contents of the training modules which includes the introduction to Aesthetic Dentistry, cosmetic contouring, Minimal Invasive Dentistry and all- ceramic restorations. Part II dealt on the mode of presentation of training modules in Aesthetic Dentistry. Part III dealt on the modes of assessment. The three parts required the respondents to rate the components of Aesthetic Dentistry using the scale 5 (VMI/VMN) = Very much important/ Very much needed, 4 (MI/MN) = Much important / Much needed, 3 (MoI/MoN) = Moderately important / Moderately needed, 2 (LI/LN) = Least important/ Least needed, 1 (NI/NN) = Not important/ Not needed.

The researcher requested five [5] experts for content validation of the questionnaire. These were administrators and faculty in the School of Dentistry, a Curriculum and Supervision teacher from graduate school and one of the Board of Directors of institution C. Furthermore, the researcher conducted a test on the validity of the instrument used. A dry-run was conducted to 30 Restorative dentistry faculty members. Selected faculty members who validated the questionnaires were not included in the study. The researcher asked the respondents for their feedback in answering the questions. The researcher improved the questionnaire based on the respondents' suggestions.

The data were treated in relation to what was asked in the specific objectives. IBM SPSS version 21 was used for this purpose. The statistical data that were used in the study were the frequency count which was used to determine the number of occurrences in each item for the components of the training modules. Percentage was utilized for the items for the components of the training modules to standardize the frequency of occurrence per as fractions of 100. Weighted mean was employed to get the typicality of the responses on each component of the training modules from the set of options while standard deviation was used to determine the deviation of responses on the components of the training modules.

### Results

It could be gleaned from Table 1 that the respondents felt that the indications and limitations of bleaching as well as external bleaching are “very much important/very much needed” in designing a training module. Amongst all others in the Introduction to Aesthetic Dentistry, these two got the highest mean 4.57 and 4.55 respectively. This is justified by Dr. Jagyasi (2014) who mentioned in his article in 2014 that cosmetic bleaching and bonding are two of the most popular dental services provided by the dentists in Philippines. He also added that discolored and stained teeth can make you look ugly and it makes the patients lack self-confidence. [4] The results also yielded that the concept of smile design and digital photography is also “much important/much needed”. Aesthetic analysis scored the highest mean of 4.13 among the other concepts of smile design followed by dental analysis with a mean of 3.79. Third is the facial analysis which was followed closely by dentolabial analysis with a mean of 3.61. All of these concepts are intertwined. This is because of the harmony that each contributes to beauty. The means of the Principles of digital photography does not vary greatly from each other. The Practical Exercises in Digital Photography has the lowest mean of 3.81 while profile photography has the highest mean of 3.89. Dr. Patel (2013) stated that clinical photography is a very important tool in general practice in documenting treatment, especially in aesthetic and cosmetic cases. [5]

**Table 1: Introduction to Aesthetic Dentistry**

	Mean	Standard Deviation	Verbal Interpretation
1.1 Concept of smile design	4.13	4.60	MI/MN
1.1.1 Aesthetic Analysis			
1.1.2 Facial Analysis	3.64	.92	MI/MN
1.1.3 Dentolabial Analysis	3.61	.89	MI/MN
1.1.4 Dental Analysis	3.79	.86	MI/MN
1.2 Bleaching	4.57	.61	VMI/VMN
1.2.1 Indications and Limitations			
1.2.2 Internal Bleaching	4.03	1.04	MI/MN
1.2.3 External Bleaching	4.55	.57	VMI/VMN

1.2.4 Home Bleaching / In-Office Bleaching	3.99	.89	MI/MN
1.3 Principles of Digital Photography	3.83	.73	MI/MN
1.3.1 Requirements for the Photographic Documentation			
1.3.2 Profile Photography	3.89	.71	MI/MN
1.3.3 Practical Exercises in Digital Photography	3.81	.71	MI/MN

Interestingly, Table 2 presents the most heterogenous response. With regard to direct aesthetic treatment using composite, peg shaped lateral, diastema closure and reconstruction following trauma elicited a “very much important/ very much needed” response with both peg shaped lateral and diastema having the same mean of 4.54. Black triangles gave a “least important/least needed” response with a mean of 2.05. A probable reason for this result is because of its demand. Nash (2013) said that fees can generally be lower for direct than indirect procedures since there is no second appointment or temporary restorations required and no laboratory expenses. [6] For the adhesive, respondents stated that the generation of dental adhesives are “moderately important/ moderately needed” with a mean of 3.40. The technique using dental adhesives has a mean of 3.44 with a verbal interpretation of “much important/much needed”. According to Nazarian (2007), there a variety of aesthetic and functional materials to choose from when faced with the need to perform aesthetic procedures. This may be the reason why the technique in using the dental adhesives scored higher rather than just simply knowing the generations of dental adhesives out in the market. [7]

**Table 2: Cosmetic Contouring**

	Mean	Standard Deviation	Verbal Interpretation
2.1 Direct Aesthetic Treatment Using Composite			
2.1.1 Peg shaped Lateral	4.54	.67	VMI/VMN
2.1.2 Diastema Closure	4.54	.71	VMI/VMN
2.1.3 Black Triangles	2.05	1.44	LI/LN
2.1.4 Reconstruction Following Trauma	4.50	.69	VMI/VMN
2.2 Adhesive			
2.2.1 Generation of Dental Adhesive	3.40	.96	MoI/MoN
2.2.2 Technique Using Dental Adhesive	3.44	.96	MI/MN

From Table 3, we can see that in all aspects of all-ceramic restorations, the respondents stated that they are all “very much important/very much needed in the training module. It can be seen in the table that the highest mean of 4.45 corresponds to the installation and cementation of inlays. Ranked second are the tooth preparation of veneers and the diagnosis and treatment planning of veneers with a mean of 4.44. The aspect which ranked the least is the diagnosis and treatment planning for inlays with a mean of 4.38. The findings of the Shenoy and Shenoy in 2010 stated the disadvantage of dental ceramics as restorative materials is that it is not capable of withstanding forces such as mastication. This limitation does not pose as a barrier to the respondents because it is still ceramics that give the utmost aesthetic results. [8] Alternately, Yang, Cook and Paddock in 2005 justified the use of ceramics when they said that patients often demand aesthetic posterior restorations forcing the restorative dentist to utilize alternatives to traditional direct or indirect metallic restorative materials. Current porcelain systems provide outstanding aesthetics and sufficient strength to be considered for many posterior applications. [9]

**Table 3: All-Ceramic Restoration**

	Mean	Standard Deviation	Verbal Interpretation
4.1 Inlay	4.28	.76	VMI/VMN
4.1.1 Diagnosis and Treatment Planning			
4.1.2 Indications and Contraindications	4.34	.69	VMI/VMN
4.1.3 Tooth Preparations	4.44	.65	VMI/VMN
4.1.4 Installation and Cementation	4.45	.67	VMI/VMN
4.2 Onlay	4.43	.63	VMI/VMN
4.2.1 Diagnosis and Treatment Planning			
4.2.2 Indications and Contraindications	4.43	.65	VMI/VMN
4.2.3 Tooth Preparation	4.40	.67	VMI/VMN
4.2.4 Installation and Cementation	4.43	.69	VMI/VMN
4.3 Veneers	4.44	.59	VMI/VMN
4.3.1 Diagnosis and Treatment Planning			
4.3.2 Indications and Contraindications	4.36	.64	VMI/VMN
4.3.3 Tooth Preparation	4.39	.67	VMI/VMN
4.3.4 Installation and Cementation	4.35	.66	VMI/VMN

It could be disclosed in Table 4 that with regard to objectives, to demonstrate the required skills and dexterity needed in aesthetic work is the only one which respondents felt that is “very much important/very much needed in the mode of presentation. This garnered a mean of 4.24 while to apply the principles and techniques in aesthetic dentistry in real world setting and explain the importance of aesthetic dentistry in relation to other disciplines in dentistry obtained a mean of 4.20 and 4.13 respectively. For the activities, all of which obtained a verbal interpretation of “very much important/very much needed” with performing clinical practical training having the highest mean of 4,26. Ricard (1990) emphasizes that for a module to be useful, congruence must be evident between learner needs and its content. Special attention should be directed to outcomes, activities, and evaluation procedures. Effective modules outline material clearly and attractively. Content is distributed logically and creatively; information is accessible. [10]

**Table 4: Modes of Presentation**

	Mean	Standard Deviation	Verbal Interpretation
<i>MODES OF PRESENTATION</i>			
1. Objectives	4.13	.67	MI/MN
1.1 Explain the importance of Aesthetic Dentistry in relation to other Disciplines in Dentistry			
1.2 Apply the principles and techniques in Aesthetic Dentistry in real world setting	4.20	.67	MI/MN

1.3 Demonstrate the required skills and dexterity needed in aesthetic work	4.24	.72	VMI/VMN
<b>2. Activities</b>			
1. Conducting and holding clinical conferences	4.21	.69	VMI/VMN
2. Preparing simulated model cast and ivory tooth	4.24	.73	VMI/VMN
3. Performing clinical practical training	4.26	.73	VMI/VMN

It is apparent from Table 5 that traditional assessment was seen to have more importance/need as compared to authentic assessment. This is contrary to the conclusion of Varley (2008) that the advantages of this assessment are that it makes students strive and do things at higher level of standards which also fosters mastery of the subject matter. [11] The objective type of test has a mean of 4.24 with the only one with the verbal interpretation of “very much important/very much needed. Dikli (2003) on the other hand, stated that the disadvantage of which, is that students may misinterpret the question if it was not delivered clearly and precisely. [12] The portfolio has a mean of 2.59 with a verbal interpretation of “least important/least needed” perhaps because this is not a common type of assessment used in Dentistry or the faculty members might not very familiar with this type of assessment.

**Table 5: Modes of Assessment**

	Mean	Standard Deviation	Verbal Interpretation
<b>MODES OF ASSESSMENT</b>			
1. TRADITIONAL ASSESSMENT	4.24	.68	VMI/VMN
1.1 Objective-type of test			
1.2 Alternative-answer type of test	4.10	.69	MI/MN
1.3 Multiple choice	4.08	.63	MI/MN
2. AUTHENTIC ASSESSMENT	4.20	.69	MI/MN
2.1 Performance type (hands-on)			
2.2 Rubrics	3.89	.81	MI/MN
2.3 Portfolio	2.58	1.29	LI/LN

**Discussion**

Based on the results of the data, the following findings are enumerated:

1. Different Components of Aesthetic Dentistry which are Needed in Designing of the Training Module

The following components of Aesthetic Dentistry were rated very much needed by the participants:

- Bleaching
  - o indications and limitations of bleaching
  - o external bleaching
- Direct Aesthetic Treatment Using Composite
  - o peg shaped lateral
  - o diastema closure

- o reconstruction following trauma
- All-Ceramic Restoration
- o inlay
- o onlay
- o veneers

## 2. Presentation of Training Modules.

The training modules must contain the following:

- Objectives
- o Demonstrate the required skills and dexterity needed in aesthetic work
- Activities
- o Conducting and holding clinical conferences
- o Preparing simulated model cast and ivory tooth
- o Performing clinical practical training

## 3. Modes of Assessment Needed in the Training Modules

The traditional assessment was seen to have more importance/need as compared to authentic assessment.

## 4. Training modules to be prepared in Aesthetic Dentistry

A Prototype Outcomes-based Training Modules in Aesthetic Dentistry was designed based on the study.

## Conclusions

Grounded on the findings of the study, the following conclusions were made:

1. External bleaching as well as its indications and limitations , direct aesthetic treatment using composite for peg-shaped lateral, diastema closure and reconstruction following trauma, all-ceramic restoration of inlay, onlay and veneers are the components needed in the Aesthetic Dentistry training modules.

2. Demonstration and hands-on training is the preferred mode of training.

3. The trainors favored the objective type of assessment in the training. The objective type of assessment is needed in the Aesthetic dentistry training modules.

4. The Outcomes-based training modules must be part of the Aesthetic Dentistry training modules

The training modules must contain the following parts:

- a. Training Outcomes
- b. Training Content
- c. Training Procedures
- d. Training Workshops and Activities
- e. Training Assessment

Furthermore, the training module must be pilot tested and validated for its usefulness. Replication of the study may be done at a larger scale.

## References:

Book

1. Schmidseider, J. Color atlas of dental medicine: aesthetic dentistry. Stuttgart: New York, 2011.

2. Eggen, P. & Kauchack, D. Educational psychology: windows on classrooms. 6th ed. New Jersey: Pearson, 2004.

3. Fraser, B. J., Tobin, K., & McRobbie, C. J. Second International Handbook of Science Education Vol. 24. New York: Springer, 2012.

Web Source

4. Jagyasi, D. P. (2014). *Medical Tourism.com*. Retrieved July 20, 2014, from Medical Tourism.com: <http://www.medicaltourism.com/blog/medical-tourists-flocking-to-philippines-for-cosmetic-dental-surgery/>.

Newspaper

5. Patel, D. A. (2013). Clinical digital dental photography. *Dental Tribune*.

Web Source

6. Nash DDS, R. W. (2013). Direct Composite Resin Restorations for Today's Practice. Retrieved July 29, 2014, from Dentistry Today: <http://www.dentistrytoday.com/aesthetics/9591-direct-composite-resin-restorations-for-todays-practice>

7. Nazarian DDS, A. (2007). The Progression of Dental Adhesives. Retrieved July 29, 2014, from The Progression of Dental Adhesives: <http://www.kerrdental.com/cms-filessystem-action?file=KerrDental-Products-Articles/adhesives-nazarian.pdf>

Article in a Journal

8. Shenoy, A., & Shenoy, N. (2010). Dental Ceramics: An Update. *Journal of Conservative Dentistry*.

9. Yang, S. C., Cook, N. B., & Paddock, C. W. (2005, February). All ceramic inlays and onlays. Naval Post Graduate Dental School.

10. Ricard, V. B. (1990). Techniques: Developing Learning Modules for Adults. *Journal of Adult Education*.

11. Varley, M. A. (2008). Teachers' and Administrators' Perceptions of Authentic Assessment at a Career and Technical Education Center. Michigan: ProQuest LLC.

12. Dikli, S. (2003). Assessment at a distance: Traditional vs. Alternative Assessments. *The Turkish Online Journal of Educational Technology*, 13-19.





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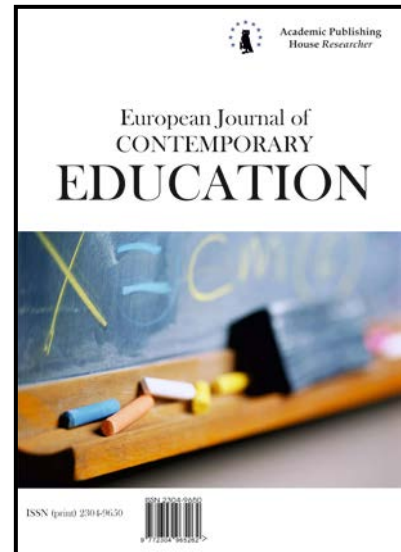
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UDC 37

### **Piagetian Conservation Tasks in Ghanaian Children: the Role of Geographical Location, Gender and Age Differences**

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#### **Abstract**

The study investigated the influence of geographical location, gender and age on the performance of Piagetian Conservation tasks. Four conservation tasks; conservation of liquid, length, substance amount and number respectively were administered to children [4-6 years] from rural and urban Ghana and their performance on each task were recorded. Results indicated that there were no significant relationships among the performance of Piagetian conservation tasks and geographical location. Similar trends were noted in the performance of gender and age differences on Piagetian conservation tasks. Nonetheless, older children performed better on the conservation of liquid in a glass than younger children. Based on the results, both quantities and perceptual comparisons can be applied in future studies to examine some possible variations in children's cognitive development.

**Keywords:** Piaget; conservation; cognitive development; age; geographical location; gender; pedagogy; experiment; Ghana.

#### **Introduction**

"Which weighs more; a ton of lead or a ton of feathers"? In order to answer this question, some form of scientific reasoning is needed to draw a conclusion. Fundamental to all scientific

thought, whether executed in a controlled laboratory or in daily life experience, is the principle of conservation. Psychologist Jean Piaget developed a cognitive developmental theory based on the assumption that early development occurred in a specific stage-like manner. Significant within this theory is the concept of conservation. Conservation can be defined as the credence in the permanence of certain attributes of objects or situations not regarding superficial changes (Santrock, 2012). According to Piaget, the conservation task among children is a reliable pointer of cognitive functioning (Piaget, & Inhelder, 1959; Piaget, 1995).

It is vital for the child to recognise the invariance of number and quantity, which forms the root of Piaget's theories of concept development. According to Piaget's Stages of Cognitive Development, there are certain achievements, activities, and limitations that correspond to each stage and approximate age (Durr, 2001). In effect, children at the preoperational stage cannot conserve. Conservation acquisition is the ability to recognize that though a particular amount has changed its appearance, it is still the same amount. Piaget indicated that this ability marks the end of the preoperational stage and the beginning of the concrete operational stage (Dworetzky, 1990).

Piaget's theory since its development has proven to be useful in many aspects of developmental sciences, pedagogy and psychology till today. Nonetheless, the validity of conservation tasks had been critiqued widely by several authors. While some studies in the past had observed that children across cultures achieve certain Piagetian tasks just about the predicted ages and order (Brainerd, 1978; De Lemos, 1969), others had implied that children perform better when measured on quantities rather than perceptual comparisons (Roazzi, & Bryant, 1997). According to Bryant and Trabasso (1971), children's failure in conservation task can be attributed to memory constraints rather than the quality of reasoning. The problem of language of instruction during the task performance, other than the lack of reversibility of thought had been proved also, as the cause for lack of conservation among children. Weight conservation among Zambian children was in effect measured using a non-verbal approach to escape this problem (Heron, & Simmomsson, 1969). In our study, we rather used a two-way verbal communication approach. This method allowed the children to give verbal justifications for their choice of answers to the verbal questions of researchers. Thus, we sought to provide an in-depth analysis unlike other previous studies.

The need for a good conservation capacity among children is indeed essential for several academic tasks, for example, in the study of mathematics and other scientific subjects. Such subjects are dependent on the cognitive ability of children to maintain reversibility of thought (Chaplin, & Johnson, 2006). Children of African-American descent who were thought of being in the preoperational level of cognitive development performed poorer in mathematics compared to children of Caucasian decent (Cooper, & Schleser, 2006). Additionally, although conservation capacity of most children improves along with age (Bisanz, Dunn, & Morrison 1995), it is not a direct attribute of age (Ginsberg & Opper, 1969). In effect, the recognised assumption that the relationship between the conservation task and the quality of reasoning among children is not at all as simple as Piaget's theory presumed (Baucal, & Stepanović, 2006).

Taking into consideration the concerns raised by the studies discussed above, we raise the research question, "what is the connection between individual factors (like age and gender) as well as the geographical location (rural and urban) on conservation acquisition of children on different tasks (liquid, length, substance amount and number)?" The absence of an experiment among Ghanaian children that will take into consideration the content analysis of participants' motivation for decisions or choice of answers was a great opportunity for us to embark on this research.

## **Method**

### ***Participants***

One-hundred and twenty children each of equal number of males and females from ages four to six were selected randomly from Nsakina Municipal Assembly School (rural children) and the University of Ghana Primary Schools (urban children) to participate in the experiment. This was because children with these ages were more likely to the characteristics of pre-operational stage of cognitive development (which is between 2 and 7 years old), where conservation is one of the predominant challenges (Dworetzky, 1990; Piaget, 1951, 1952). Reference of their age distribution can be referred from Tables 1, 2, 3 and 4.

### **Materials**

The apparatus used included three glasses, two of the same size and a third one of differing size and height and a coloured drink to fill the glasses. In addition two sticks of equal length labelled A and B, ten stones of similar size and shape, plasticine were moulded and scoring sheets were used to record the children's performance on the Piagetian Conservation Tasks.

### **Procedure**

Approval to proceed with experiment was obtained from the Department of Psychology at the University of Ghana, Nsakina Municipal Assembly School and the University of Ghana Primary Schools.

Subsequently, written consents were obtained from all parents and teachers of the children following the verbal agreement of willing children, who were randomly sampled. Four conservation tasks; conservation of liquid, length, substance amount and number respectively was administered to each child and their performance on each task recorded. Using a two-way verbal communication approach, children were offered the tasks and subsequently allowed to give their responses and rationale for their choices. For each correct response, a participant is scored one point. The total points for each child were added up to obtain the raw total conservation score. Simple classification rule of raw scores included the following: participants with scores above three correct points out of the four tasks were classified as good conservers. Those with scores of two points were classified as moderate conservers while scores below two points were classified as non-conservers.

### **Design**

The experimental design was between-subject design. A between-subject design is an experimental design in which different groups of scores are obtained from separate groups of participants. This experimental design was chosen in order to obtain different groups of scores from rural and urban children and also male and female children (Charness, Gneezy, & Kuhn, 2012). The test consisted of four tasks, each having four steps. Therefore, there were sixteen steps in all.

The following describes the conservation tasks which were administered:

#### **Task 1 Conservation of Liquid in a Glass**

Two identical glasses labelled A and B each filled with the same amount of liquid were presented to the child. The child was to agree that they were of equal amount. The liquid in glass B was poured into a glass C which is taller and thinner than A and B, while the child is looking on. The child was asked "Which glass has more water A or C, or do they both have the same amount?" They were then asked why they gave such an answer.

#### **Task 2 Conservation of Length**

Two sticks of equal length were placed in front of the child so they are parallel. The child was to agree that they are of equal length. One stick was then moved over, while the child is looking on. The child was asked "Which stick is longer or are the sticks of equal length?" They were then asked why they gave such an answer.

#### **Task 3 Conservation of Substance Amount**

Two identical plasticine balls were centered in front of the child. The child was to acknowledge that they are equal amounts of plasticine. One of the balls was rolled out into a sausage shape, while the child is looking on. The child was then asked "Which plasticine ball has more, or do they both have the same amount?" They were asked why they gave such an answer.

#### **Task 4 Conservation of Number**

Two groups of small stones of similar sizes, five in each group were lined up about two inches apart in the center in front of the child. The child was to acknowledge that they are equal in number. One group was brought close together such that the stones were about half an inch apart, while the child is looking on. The child was asked "Which group has more stones, or do both groups have the same number of stones." They were then asked why they gave such an answer.

### **Content Analyses of Reasons Offered for their Choice of Answers**

This provides a tabular summary of content analyses of the children responses offered for their choices during the experiment.

**Table 1: Task 1**

<b>TASK 1 RURAL</b>	<b>AGE</b>	<b>A&gt;C</b>	<b>C&gt;A</b>	<b>A* = C*</b>	<b>A1≠C1</b>	<b>C1&gt;A1</b>
	4	18	4	12	5	1
	5	14	7	12	2	4
	6	21	7	5	4	4
<b>TOTAL</b>		53	18	29	11	9
<b>TASK 1 URBAN</b>						
	4	16	8	12	1	1
	5	12	10	10	3	2
	6	20	6	8	4	1
<b>TOTAL</b>		48	24	30	8	4

Notes: A → Glass A; C → Glass C; A1 → Liquid in Glass A; C1 → Liquid in Glass C; A>C → Glass A is bigger/taller/longer than Glass C; C>A → Glass C is bigger/taller/longer than Glass A; A\* = C\* → Glass A/Liquid in Glass A and Glass C/Liquid in Glass C are the same.

**Table 2: Task 2**

<b>TASK 2 RURAL</b>	<b>AGE</b>	<b>A&gt;B</b>	<b>B&gt;A</b>	<b>A=B</b>	<b>A≠B</b>
	4	20	6	11	4
	5	20	6	7	7
	6	19	6	11	3
<b>TOTAL</b>		59	18	29	14
<b>TASK 2 URBAN</b>					
	4	15	6	12	8
	5	17	5	8	10
	6	25	8	3	3
<b>TOTAL</b>		57	19	23	21

Notes: A → Stick A; B → Stick B; A>B → Stick A is longer/bigger than Stick B; B>A → Stick B is longer/bigger than Stick A; A≠B → Stick A is not the same as Stick B.

**Table 3: Task 3**

<b>TASK 3 RURAL</b>	<b>AGE</b>	<b>B&gt;SS</b>	<b>SS&gt;B</b>	<b>B=SS</b>	<b>B≠SS</b>
	4	2	10	6	19
	5	4	15	9	12
	6	5	9	9	20
<b>TOTAL</b>		11	34	24	51
<b>TASK 3 URBAN</b>					
	4	4	7	8	21
	5	2	16	9	14
	6	4	6	11	18
<b>TOTAL</b>		10	29	28	53

Notes: B → Ball-shaped plasticine; SS → Sausage-shaped plasticine; B >SS → Ball-shaped plasticine is bigger than Sausage-shaped plasticine; SS>B → Sausage-shaped plasticine is bigger than Ball-shaped plasticine; B=SS → Ball-shaped plasticine and Sausage-shaped plasticine are the same.

**Table 4: Task 4**

<b>TASK 4 RURAL</b>	<b>AGE</b>	<b>S&gt;C</b>	<b>C&gt;S</b>	<b>S=C</b>	<b>S≠C</b>
	4	9	4	13	14
	5	5	7	11	17
	6	10	8	10	12
<b>TOTAL</b>		24	19	34	43
<b>TASK 4 URBAN</b>	<b>AGE</b>	<b>S&gt;C</b>	<b>C&gt;S</b>	<b>S=C</b>	<b>S≠C</b>
	4	7	5	13	16
	5	9	8	13	10
	6	8	5	10	16
<b>TOTAL</b>		24	18	36	42

Notes: S → Spaced-out stones; C → Clumped-together; S>C → Spaced-out stones are more than those clumped together; C>S → Stones clumped together are more than those spaced-out; S≠C → Stones spaced out are not the same as those clumped together; S=C → Stones spaced out are the same as those clumped together.

**Results**

**Geographical location and Conservation Tasks Hypotheses**

**Hypothesis 1a.** The first hypothesis under this theme explored the effect of geographical location differences in the performance of children on the conservation of liquid in a glass. It was hypothesised that “urban children were more likely to perform better in Task 1 than rural children”. A Chi Square Goodness of Fit Test with one degree of freedom (*df*) showed that this hypothesis was not significant, [ $\chi^2_{(1)} = 0.089, \rho = 0.766$ ]. Hence, there is no significant difference in the performance of urban and rural children on the conservation of liquid in a glass. Figure 1 shows a scatter plot of geographical location and Task 1.

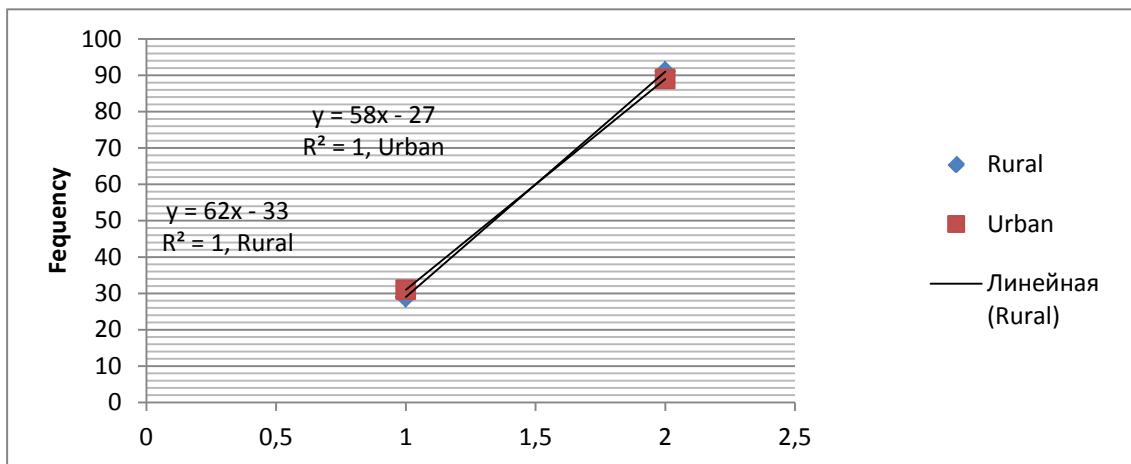


Fig. 1. Scatter Plot of Geographical location and Task 1

**Hypothesis 2a.** The second hypothesis also explored the effect of geographical location differences in the performance of children on the conservation of length. It was hypothesised that “urban children were more likely to perform better in Task 2 than rural children”. A Chi Square Goodness of Fit Test with one degree of freedom (*df*) indicated that this hypothesis was also not significant, [ $\chi^2_{(1)} = 1.617, \rho = 0.204$ ]. Consequently, there is no significant difference in the performance of urban and rural children on the conservation of length. Figure 2 displays a scatter plot of geographical location and Task 2.

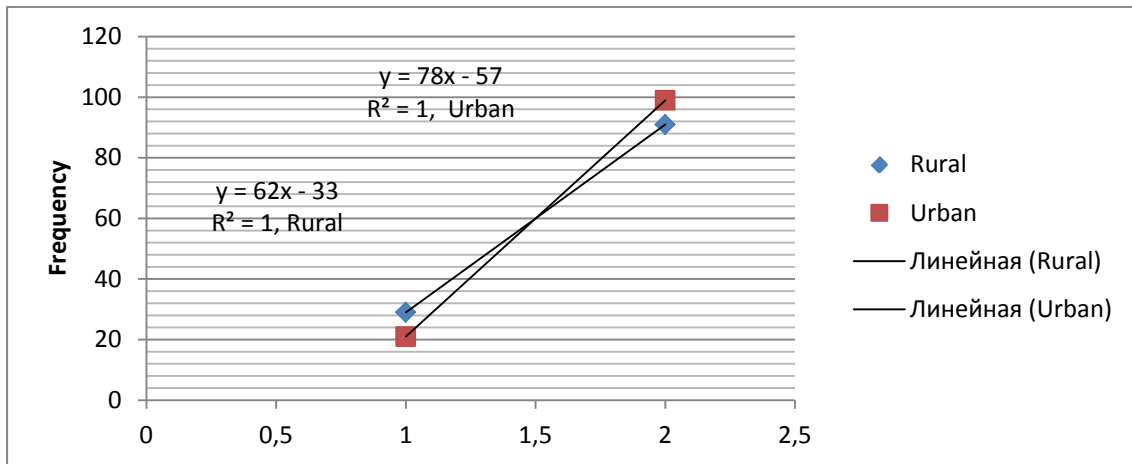


Fig. 2. Scatter Plot of Geographical location and Task 2

**Hypothesis 3a.** The third hypothesis however examined the effect of geographical location differences in the performance of children on the conservation of substance amount. It was hypothesised that “urban children were more likely to perform better in Task 3 than rural children”. A Chi Square Goodness of Fit Test with one degree of freedom (*df*) indicated that this hypothesis was also not significant, [ $\chi^2 (1) = 1.187, \rho = 0.276$ ]. As a result, there is no significant difference in the performance of urban and rural children on the conservation of substance amount. Figure 3 shows a scatter plot of geographical location and Task 3.

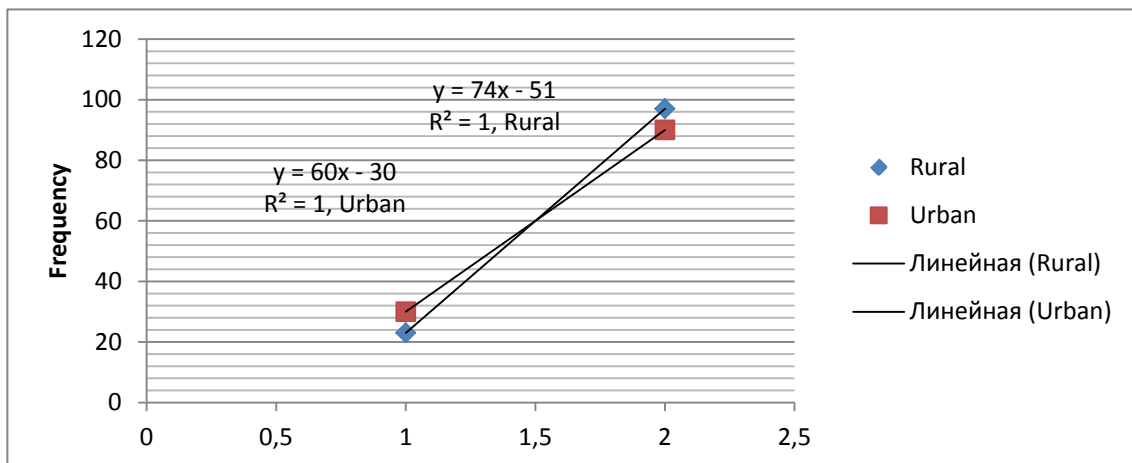


Fig. 3. Scatter Plot of Geographical location and Task 3

**Hypothesis 4a.** The fourth hypothesis under this theme examined the effect of geographical location differences in the performance of children on the conservation of number. It was hypothesised that “urban children were more likely to perform better in Task 4 than rural children”. A Chi Square Goodness of Fit Test with one degree of freedom (*df*) showed that this hypothesis was as well not significant, [ $\chi^2 (1) = 0.726, \rho = 0.394$ ]. For that reason, there is no significant difference in the performance of urban and rural children on the conservation of number. Figure 4 shows a scatter plot of geographical location and Task 4.

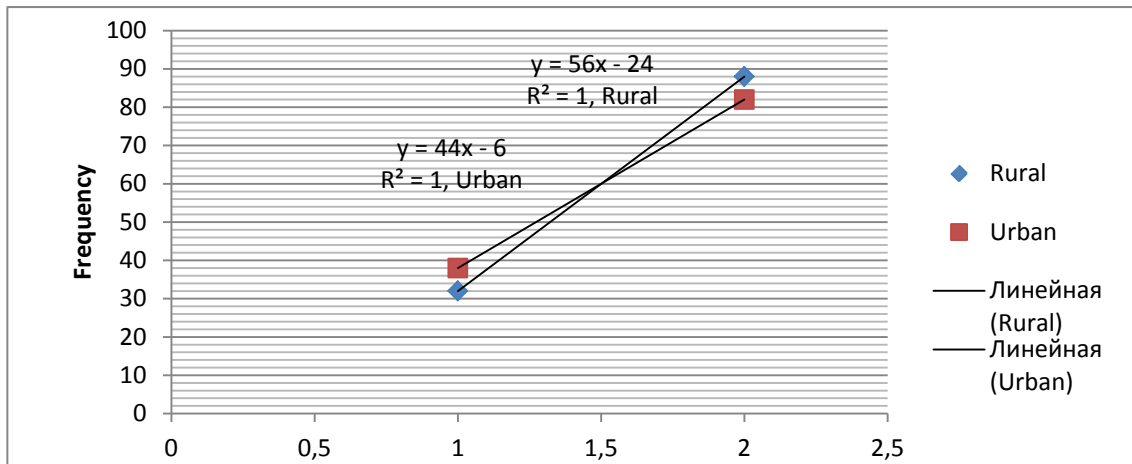


Fig. 4. Scatter Plot of Geographical location and Task 4

**Gender and Conservation Tasks Hypotheses**

**Hypothesis 1b.** The first hypothesis under this theme explored the effect of gender differences in the performance of children on the conservation of liquid in a glass. It was hypothesised that “male children were more likely to perform better in Task 1 than female children”. A Chi Square Goodness of Fit Test with one degree of freedom (*df*) showed that this hypothesis was not significant, [ $\chi^2 (1) = 1.422, \rho = 0.233$ ]. Hence, there is no significant difference in the performance of urban and rural children on the conservation of liquid in a glass. Figure 5 shows a scatter plot of gender and Task 1.

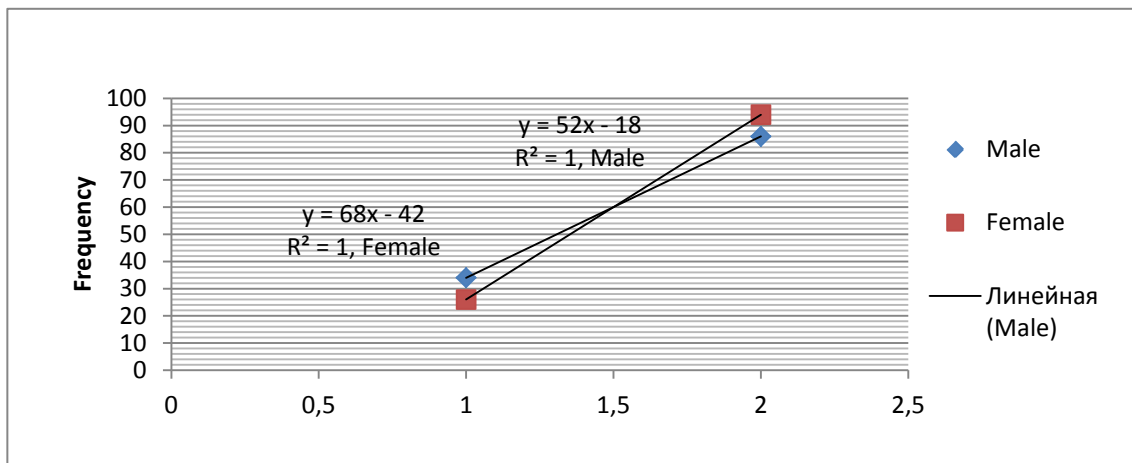


Fig. 5. Scatter Plot of Gender and Task 1

**Hypothesis 2b.** The second hypothesis under this category similarly examined the effect of gender differences in the performance of children on the conservation of length. It was hypothesised that “male children were more likely to perform better in Task 2 than female children”. A Chi Square Goodness of Fit Test with one degree of freedom (*df*) indicated that this hypothesis was also not significant, [ $\chi^2 (1) = 0.909, \rho = 0.340$ ]. Thus, there is no significant difference in the performance of urban and rural children on the conservation of length. Figure 6 illustrates a scatter plot of gender and Task 2.

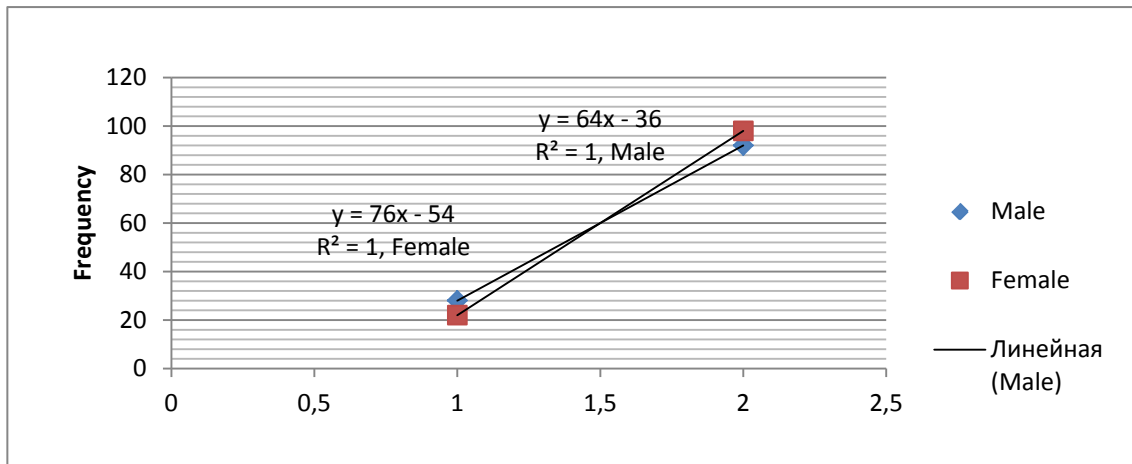


Fig. 6. Scatter Plot of Gender and Task 2

**Hypothesis 3b.** The third hypothesis nonetheless examined the effect of gender differences in the performance of children on the conservation of substance amount. It was hypothesised that “male children were more likely to perform better in Task 3 than female children”. A Chi Square Goodness of Fit Test with one degree of freedom (*df*) indicated that this hypothesis was similarly not significant, [ $\chi^2_{(1)} = 0.023, \rho = 0.876$ ]. As a result, there is no significant difference in the performance of urban and rural children on the conservation of substance amount. Figure 7 shows a scatter plot of gender and Task 3.

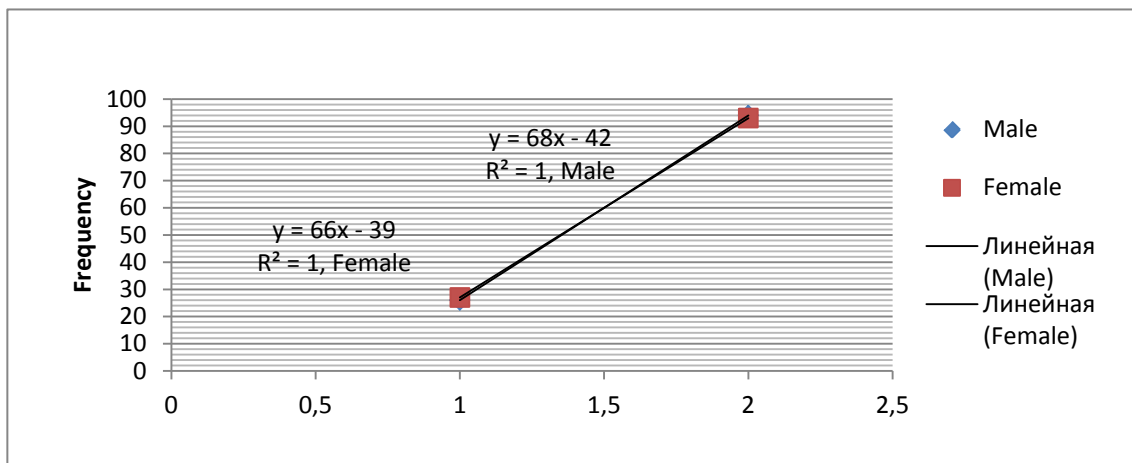


Fig. 7. Scatter Plot of Gender and Task 3

**Hypothesis 4b.** The fourth hypothesis under this category however examined the effect of gender differences in the performance of children on the conservation of number. It was hypothesised that “male children were more likely to perform better in Task 4 than female children”. A Chi Square Goodness of Fit Test with one degree of freedom (*df*) revealed that this hypothesis was as well not significant, [ $\chi^2_{(1)} = 0.081, \rho = 0.766$ ]. According to the results, there is no significant difference in the performance of male and female children on the performance of the conservation of substance amount. Figure 8 displays a scatter plot of gender and Task 4.



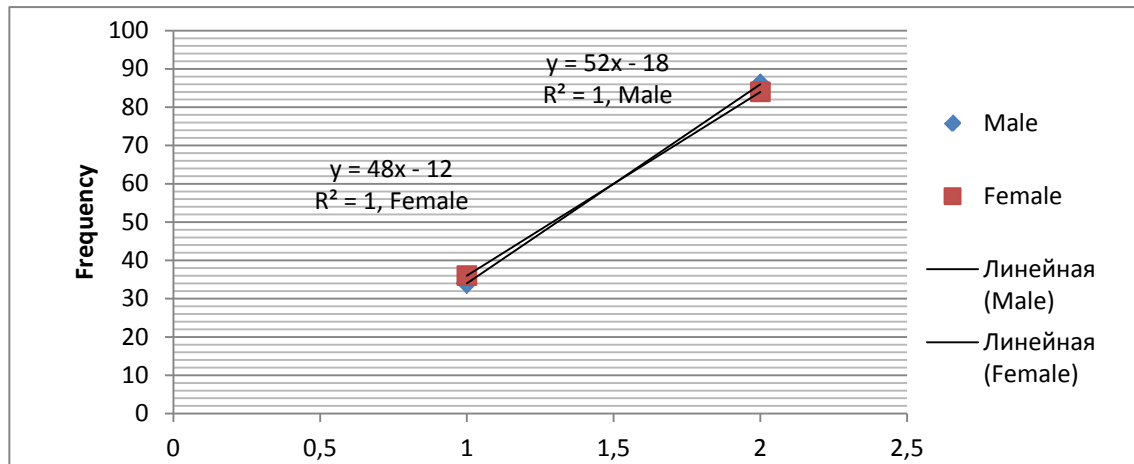


Fig. 8: Scatter Plot of Gender and Task 4

### Age and Conservation Tasks Hypotheses

**Hypothesis 1c.** The aim of the first hypothesis under this subject investigated the effect of age differences in the performance of children on the conservation of liquid in a glass. It was hypothesised that “older children were more likely to perform better in Task 1 than younger children”. A Chi Square Goodness of Fit Test with one degree of freedom (*df*) showed that this hypothesis was significant, [ $\chi^2 (1) = 4.254, p = 0.039^*$ ]. In effect, older children perform better than younger children on the conservation of liquid in a glass. Figure 9 shows a scatter plot of age and Task 1.

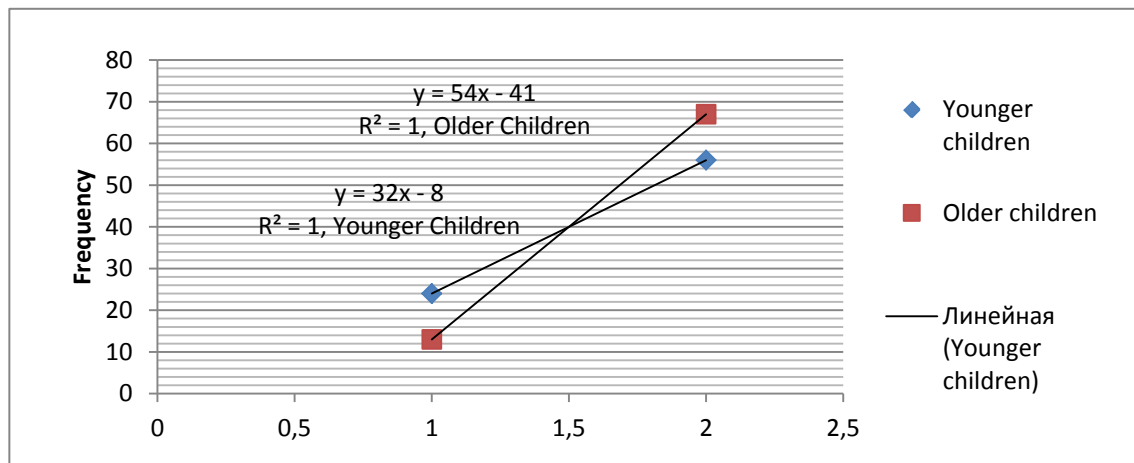


Fig. 9. Scatter Plot of Age and Task 1

**Hypothesis 2c.** The second hypothesis under this theme also looked at the effect of age differences in the performance of children on the conservation of length. It was hypothesised that “older children were more likely to perform better in Task 2 than younger children”. A Chi Square Goodness of Fit Test with one degree of freedom (*df*) indicated that this hypothesis was not significant, [ $\chi^2 (1) = 3.584, p = 0.058$ ]. Thus, there is no significant difference in the performance of older and younger children on the conservation of length. Figure 10 illustrates a scatter plot of age and Task 2.

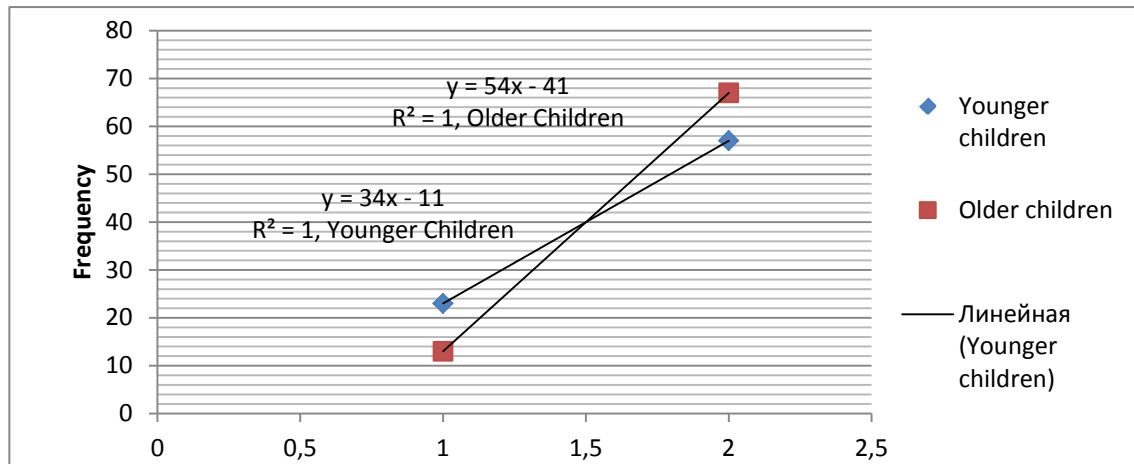


Fig. 10. Scatter Plot of Gender and Task 2

**Hypothesis 3c.** The third hypothesis under the age theme examined the effect of age differences in the performance of children on the conservation of substance amount. It was also hypothesised that “older children were more likely to perform better in Task 3 than younger children”. A Chi Square Goodness of Fit Test with one degree of freedom (*df*) indicated that this hypothesis was similarly not significant, [ $\chi^2 (1) = 0.573, \rho = 0.449$ ]. Consequently, there is no significant difference in the performance of older and younger children on the conservation of substance amount. Figure 11 shows a scatter plot of age and Task 3.

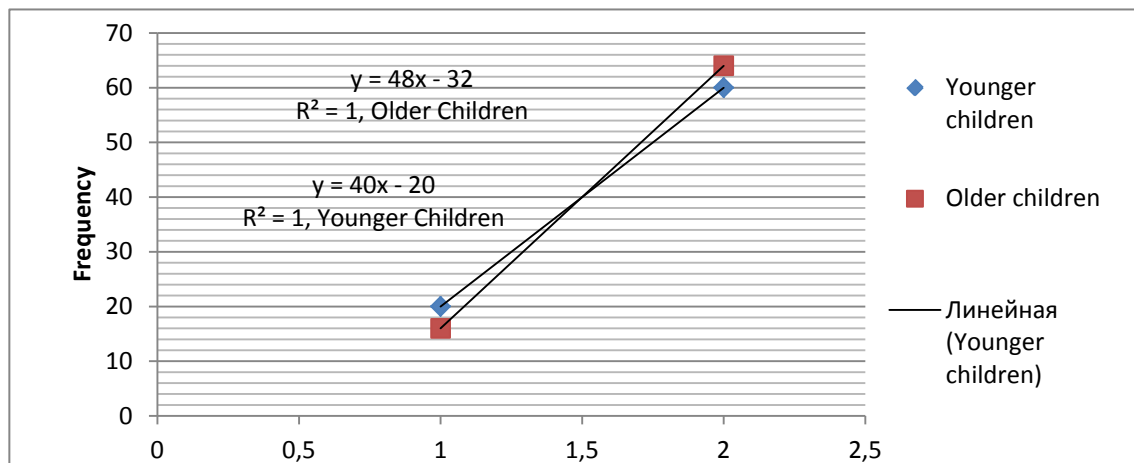


Fig. 11. Scatter Plot of Age and Task 3

**Hypothesis 4c.** The fourth hypothesis under this category on the other hand examined the effect of age differences in the performance of children on the conservation of number. It was hypothesised that “older children were more likely to perform better in Task 4 than younger children”. A Chi Square Goodness of Fit Test with one degree of freedom (*df*) revealed that this hypothesis was as well not significant, [ $\chi^2 (1) = 1.476, \rho = 0.224$ ]. According to the results, there is no significant difference in the performance of older and younger children on the performance of the conservation of substance amount. Figure 12 shows a scatter plot of age and Task 4.

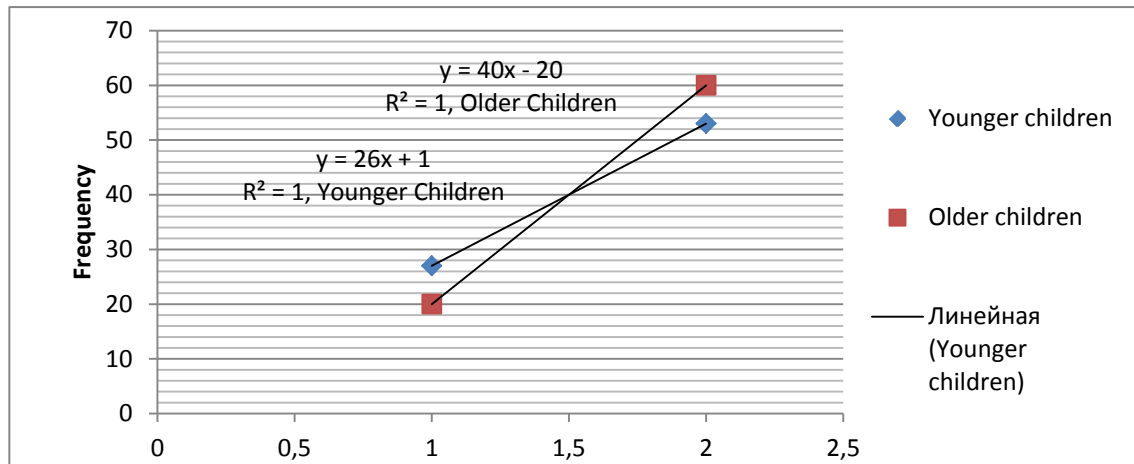


Fig. 12. Scatter Plot of Age and Task 4

**A summary of the results reveal that:**

- No significant relationships were found between performance of Piagetian conservation tasks and geographical location.
- No significant differences exist between the performance of males and females on Piagetian conservation tasks.
- No significant differences existed between age performances of Piagetian conservation tasks except the conservation of liquid.

**Our work has the following novelties:**

- For the first time in the performance of Piagetian conservation studies, Ghanaian children have been examined with local and familiar materials.
- We have experimentally analysed how gender, age, and geographical locations consecutively influence children's performance on four conservation tasks.
- We also examined the relationship between choice of answers given by children and their rationale for choosing such options using content analysis.

**Discussion**

Piaget's term for children's inconsistency in thinking within a developmental stage; explains why, for instance, children do not learn conservation tasks about numbers and volume at the same time. There were no significant differences in the performance of rural and urban children on Piagetian conservation tasks in this current study. This is quite different from the well-known assumption that geographical location during childhood is very extrapolative on consequences like health, cognitive development, and academic achievement (Adler, & Rehkopf, 2008; Merikangas et al., 2010; Shanahan, Copeland, Costello, & Angold).

A possible explanation for this inconsistency could possibly be as a result of the same teaching methods both schools uses under the auspices of the Ghana Education Services. Nonetheless, there was an evident lack of suitable materials and facilities in Nsakina M/A Primary as compared to the University Primary School. Also, the performance of rural and urban children being almost the same could be due to the social learning that precedes development and thus highlight the role of culture, social factors and language on cognitive development (Vygotsky, 1978). Consequently, no single principle for example Piaget's equilibration can justify for holistic cognitive development. There are complex interactions with an individual development framework that cannot be understood without reference to the social and cultural context within which the development is set in (Baucal, & Stepanović, 2006).

There were no significant differences in the performance of male and female children on Piagetian conservation tasks. These findings are consistent with those of Heron and Simmonsson (1969) which found no significant difference in the conservation performance between male and

female children. The acquisition of conservation is developmental and as proposed by Piaget, both males and females pass through the same stages of development.

The results also showed no significant difference in the performance of older and younger children on Piagetian conservation tasks except the conservation of liquid in a glass. These findings are consistent with the results of McGarrigle and Donaldson (1974). They found out that children can conserve even at a younger age than that proposed by Piaget. This study suggests that, Piaget's design prevented the children from showing that they can conserve at a younger age than he claimed. However, the older children performed better than younger children in the conservation of liquid in a glass possibly because they might have had more familiarity with the properties of liquids as compared to the younger children.

The results of the content analysis which summarises the reasons participants gave for their choice of answers made clear that, it is highly improbable that children's responses in various conservation situations were channelled by a single generalised mental structure. Relatively, there seems to appear several diverse logical concepts, which come into operation depending on the task characteristics. Superficially, these operations are not so closely connected and integrated into an all-inclusive cognitive structure as Piaget's theory neglects (Baucal, & Stepanović, 2006; Wolfgang, 1974).

### **Limitations**

This study only measured children on quantities rather than perceptual comparisons (Roazzi, & Bryant, 1997). In addition, the study failed to assess whether performance on conservation tasks directly impact on formal academic achievement. Nonetheless, this study has implications for future studies in the area of psychology, pedagogy and developmental researches.

### **Recommendations**

Based on the outcome and limitations of the study, we recommend that both quantities and perceptual comparisons should be employed to explore deeper into cognitive development. Also, an accompanying neuropsychological investigation in conjunction with the study of conservation among Ghanaian children will assist in making valuable contributions. Finally, future studies may explore further into the relationship between children's performance on conservation tasks and formal academic achievement.

### **Conclusion**

The study examined the influence of geographical location, gender and age on the performance of Piagetian Conservation tasks. Notwithstanding the conflicting findings by some previous studies, results from our study indicated that there were no significant relationships between the performance of Piagetian conservation tasks and geographical location. In addition, gender and age differences did not have any significant effect on Piagetian conservation tasks. The only unique case was with the conservation of liquid in a glass as older children performed better than younger children. We also hope that this research will in due course have implications on future studies in Ghana and beyond.

### **Conflict of Interest Statement**

The authors declare that they do not have any conflict of interest.

### **References:**

1. Adler, N. E., & Rehkopf, D. H. (2008). U.S. disparities in health: descriptions, causes, and mechanisms. *Annual Reviews of Public Health, 29*, 235-252.
2. Bisanz, J., Dunn, M., & Morrison, F. J., (1995). Effects of age and schooling on the acquisition of elementary quantitative skills. *Developmental Psychology, 31*(2), 221-236.
3. Brainerd, C. J. (1978). *Piaget's theory of intelligence*. Englewood Cliff, NJ: Prentice Hall, Inc.
4. Bryant, P. E., & Trabasso, T. (1971). Transitive inferences and memory in young children. *Nature, 232*, 456-458
5. Chaplin, S. H., & Johnson, A. (2006). *Math matters* (2nd Ed.). Sausalito, CA: Math Solutions Publications.

6. Charness, G., Gneezy, U., & Kuhn, M. A. (2012). Experimental methods: Between-subject and within-subject design. *Journal of Economic Behavior & Organization*, 81 (1), 1–8.
7. Cooper, J. A., & Schleser, R. (2006). Closing the achievement gap: Examining the role of cognitive development level in academic achievement. *Early Childhood Education Journal*, 33 (5), 301-306.
8. De Lemos, M. M. (1969). The development of aboriginal children. *International Journal of Psychology*, 4, 255 – 269.
9. Durr, J. (2001). Status Julie Piaget et Vygotsky, Retrieved from [www.pierce.ctc.edu/julie\\_Piaget\\_Vygotsky/julie-status.html](http://www.pierce.ctc.edu/julie_Piaget_Vygotsky/julie-status.html).
10. Dworetzky, J. P. (1990). *Introduction to child development* (4<sup>th</sup> Ed.). USA: Columbia University Press.
11. Ginsburg, H. & Opper, S. (1969). *Piaget's theory of intellectual development*. Englewood Clieffs, NJ: Prentice-Hall.
12. Heron, A., & Simmomsson, N. (1969). Weight conservation in Zambian children: a non-verbal approach". *Inter. J. Psychology*, 4, 281-292.
13. McGarrigle, J., & Donaldson, M. (1974). Conservation accidents. *Cognition*, 3, 341-350.
14. Merikangas, K. R., He, J.-P., Brody, D., Fisher, P. W., Bourdon, K., & Koretz, D. S. (2010). Prevalence and treatment of mental disorders among US children in the 2001–2004 NHANES. *Pediatrics*, 125 (1), 75-81.
15. Piaget, J. & Inhelder, B. (1959). *La genese des structures logiques elementaires*. Neuchâtel, Delachaux et Niestlé.
16. Piaget, J. (1951). Egocentric thought and sociocentric thought. *J. Piaget, Sociological studies*, 270-286.
17. Piaget, J. (1995). Intellectual Operations and Their Development. In H. E. Gruber, & J. J. Vonèche (Eds.) *The Essential Piaget*. London, Jason Aronson Inc.
18. Piaget, J., & Cook, M. T. (1952). *The origins of intelligence in children*. New York, NY: International University Press.
19. Roazzi, A. & Bryant, P. (1997). Explicitness and Conservation: Social Class Differences. *International Journal of Behavioral Development*, 21 (1), 51–70.
20. Santrock, J. W. (2012). *Psychology*. New York: McGraw-Hill Company.
21. Shanahan, L., Copeland, W., Costello, E. J., & Angold, A. (2008). Specificity of putative psychosocial risk factors for psychiatric disorders in children and adolescents. *Journal of Child Psychology and Psychiatry*, 49 (1), 34-42.
22. Vygotsky, L. S. (1978). *Mind in society: the development of higher psychological processes*. Cambridge, MA: Harvard University Press.
23. Wolfgang, C. (1974). An exploration of the relationship between the cognitive are of reading and selected developmental aspects of children's play. *Psychology in the Schools*, 11(3), 338-343.



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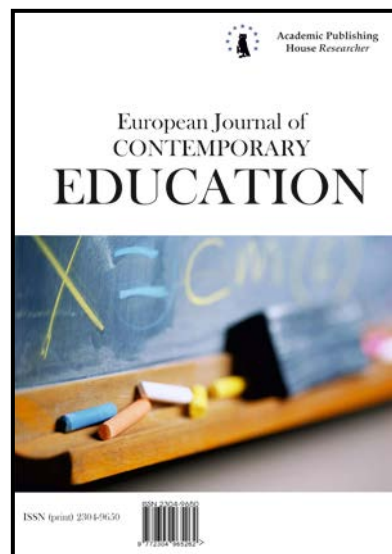
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### **The Development of the Foundations of Modern Pedagogy: Paradigm and Methodological Aspects of Research**

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#### **Abstract**

Changes in the various fields of knowledge influenced the pedagogical science. The article explains the structure of the foundations of modern pedagogy through paradigm and methodological aspects. Bases of modern pedagogy include complex of paradigms, object and subject of science, general and specific principles, methods and technologies. Paradigm analysis of bases of modern pedagogy showed that paradigms performed informational, instrumental and technological functions through connections with factors, approaches and principles accordingly. The research of methodological aspect of bases of modern pedagogics allowed to define the structure of the methodological system and main characteristics of the pedagogical system. In the article considers specific principles of optimality, optimization, adaptation and rules of their use in a pedagogical theory and practice.

**Keywords:** foundations of pedagogy, methodology, paradigm, educational system, educational process, the principle, optimality, optimization, interval, adaptation.

### **Introduction**

During the second part of the 20<sup>th</sup>- beginning of the 21<sup>st</sup> centuries,, there have been substantial changes in various areas of knowledge, including pedagogy. In scientific and educational pedagogical literature, there is often used the phrase "the foundations of pedagogy", but the authors consider differently composition and structure of the basics of science, aspects of learning.

In particular, S.I. Hessen calls a philosophical method ("pedagogy is applied philosophy") the basis of pedagogy: it is a foundation upon which pedagogical creativity, expertise, systems and methods can be built [1].

Educational psychology is the study of patterns of mental activity in training, education, development of social experience (P.Y. Galperin). Educational sociology which investigates interaction between main factors of education: social environment, activities of an individual, purposeful activity of special institutions (governmental, non-governmental) in the process of identity formation has a significant influence on the development of pedagogy.

At the turn of philosophy, pedagogy, psychology, sociology, theory of social communication and history, the pedagogical process of cognition (thinking) is studied. It allows getting into the cause-effect relations of the educational process, analyzing activities, views, experiences, finding science-based explanation of problems and their solutions, as well as predicting results of the paper [2, p. 252]. Recent studies have shown that educational knowledge has features that allow you to explore the pedagogical phenomena and objects and thus affect the foundations of science. In particular, we are talking about characteristics, such as systemness, multilevelness, optimality, adaptability, harmony, conclusiveness, structural and functional completeness. For the analysis of the scientific foundations of modern pedagogics, we use the above characteristics of pedagogical knowledge.

### **Materials and methods**

The purpose of the article is to determine the structure of the pedagogical principles, to implement the aspect analysis of the pedagogical principles in the framework of evaluation the impact of characteristics of pedagogical knowledge on their development. This goal attainment involves the following tasks: support of the extended structure of modern pedagogy foundations; to define research aspects of the science foundations – paradigmatic and methodological; performance of aspect analysis of pedagogical fundamentals; identification of the impact of the pedagogical knowledge characteristics on their development with the emergence of new paradigms, approaches, principles.

### **Discussion and results**

An object, a subject and methods are considered to be components of a science. For example, complex systems of various nature (technical, economic, biological, etc.) are the object of cybernetics, which appeared in the middle of the 20<sup>th</sup> century on the basis of scientific and technological progress, management processes is the subject, and modeling - the main method. These components are interrelated as follows: management processes take place in the system which is a condition for their implementation; modeling is necessary to determine the characteristics of the system according to its model, and to select the appropriate parameters of management.

There are several different points of view about nature of the object and the subject of pedagogy. Well-known Russian scientist V.P. Bepal'ko, whose ideas we share, says that the object of pedagogy is a person of any age, and the subject - teaching system as a condition for providing the person with learning processes, education, development and socialization [3, p. 463-464].

A.N. Aleksyuk notes that it is necessary to make clear the difference between the object and the subject of the science and the object and the subject of the investigation [4, p. 375]. The processes in the educational system are the object of the investigation in pedagogy in most cases, and the best (most effective) conditions for their implementation are the subject. So, in T.V. Lavrik's thesis, the object is the training of the university undergraduates in distance learning, and the subject - pedagogical conditions for optimization of distance learning bachelors, who study "System Sciences and Cybernetics" course at the university [5].

Recently, there has been expansion of components of the foundations of education influenced by pedagogical knowledge development. Theoretical and methodological system is considered as one of the foundations with such components: a set of paradigms; object and subject; general principles (philosophical methodology); approaches - theoretical concepts which can be used in the majority of sciences; specific principles, as well as ways to solve raised issues (modeling, methods of mathematical statistics); stages of the pedagogical process and the appropriate means [6, p. 204-205].

Let's take a closer look at the components that form the basis of modern pedagogy. The paradigm (example, sample) is: 1) a theory (model of formulation) taken as a sample of solving research tasks defined by the scientific community; 2) methodological principles of the unity of the scientific community (schools, trends) that greatly facilitates their professional communication [2, p. 248].

If a paradigm is a component of the foundations of science, it must be linked with other components – theoretical, methodological, and technological.

Modern pedagogy is based on a set of paradigms: knowledge, cultural, humanistic, administrative, social and communicational, societal, anthropocentric, technological [7]. Each paradigm is associated with an appropriate approach (systemic, cultural, humanistic, cyber, social, communication, technology) and through it affects the questions raised. The approach and method provide the instrumentality of the paradigm, its relationship with technology of the pedagogical process.

For example, knowledge-based paradigm rests on the systemic nature of educational facilities; system approach allows presenting educational system as a set of sequentially arranged components (teacher, objectives, principles, contents, methods, forms of joint activities, students) connected by backward and forward linkages. The main characteristics of the educational system are as follows: integrity, purposefulness, completeness (structural, functional), a large amount of diversity, stochastic processes, multilevelness (individual, group, of the institution, the educational system), multivariability (organization, management, communication), optimality, adaptability, harmony.

The basic method of construction and study of the educational system is a simulation. The following types of models are used: multiple, graph, structural and functional, network. Multiple model includes a plurality of components of pedagogical system arranged in a certain order, but it does not reflect the links between them.

Graph and structural and functional models reflect the components of the system, the order of their arrangement, forward and backward linkages between them. The network model of the pedagogical system displays all the above-mentioned characteristics, as well as its multi-level and multi-dimensional ones.

The analysis of the paradigms demonstrates that their combination is fully functional as it describes the static and dynamic teaching facilities, namely: knowledge, cultural, and humanistic paradigms describe statics; management, social and communication, and technology paradigms - dynamics.

A study of the development of the educational foundations is performed by means of aspect analysis. [8]. Methodological and paradigmatic aspects are selected due to the fact that it is in these areas, recently, pedagogy developed rapidly.

The study of the paradigmatic aspects of the educational foundations shows that the paradigm performs an information function through the connection with the factors, in particular: with objective factor - through societal function; with subjective factor - through knowledge, cultural, administrative, social and communication, and technological functions; with personal factor - through humanistic; and with human factor - through anthropocentric function.

As noted above, the paradigms in the set allow a review of educational objects in statics and dynamics. To perform this task at the beginning of the 21<sup>st</sup> century, two paradigms - management and social and communication - are established [9; 10].

The essence of management paradigm can be expressed by the following key theses: educational system as a condition for the implementation of the pedagogical process is differentiated into three interrelated subsystems: organization, management and communication. An integrated educational system is a process because subsystems are the conditions of the steps of the pedagogical process: the reference, cognitive and conversive, control and reflexive.



The optimality paradigm, associated with management paradigm, allows the criteria (culture of activities, culture of management – Y.V. Yaresko) and constraints (time, material, intellectual) to be proved and thus to pose the optimization problem. The paradigm of adaptation, also associated with the paradigm of management, can consider, for a criterion, a gradual transition from direct management to co-management and self-management in accordance with stages of the pedagogical process.

Application of the paradigmatic development aspect of the fundamentals of pedagogy allows us to conclude that during the above period the subject and the object of pedagogy have changed (V.P. Bepal'ko), the methodological system was supplemented by two paradigms (administrative, social and communication); it is discovered that the paradigm takes an intermediate position between the factor as a source of information and an approach that allows for an instrumental function of the paradigm - to influence the development of the components of the pedagogical systems and technologies of the pedagogical process.

Paradigmatic aspect considering the basics of pedagogy is closely related to the methodological aspect, which purpose is to justify the features of the methodological principles of the science (research). Definition of educational methodology is outlined by the authors of the article [11]. Educational methodology is the study of methods of organization (the impact on the person), management (impact on activities) that occur in the process of intercourse of subjects of pedagogical system for the reception, conversion, assimilation, preservation and use of information, providing knowledge and transformation of educational objects (pedagogical system, pedagogical process, pedagogical situation, pedagogical fact, etc.). An analysis of this definition indicates that the teaching methodology is considered in relation to those objects which are studied by means of it.

Pedagogical objects are multi-dimensional, so a set of their perception methods is represented in the form of the three taken together: the organization, management, and communication. In this case, the educational methodology is characterized by adaptability which provides correlation of the stages of the technology to the methods of organization, management, and communication, respectively.

Definition of educational methodology shows that in addition to technological display, there are such criterion characteristics of the methodology as: versatility, instrumentality, reflexivity, focus on problem solving and integration.

At this point of pedagogy development, when the processes of differentiation leave behind the integration processes, come first: a link between theory and practice (universality); implementation in practice of integration of pedagogical systems of organization, management, and communication (instrumental); integration of the components of pedagogical systems for solving specific problems; provision of continuity between the levels of the educational system; realization of the relationship between goals, objectives, stages of educational process, and results.

The analysis shows that methodological knowledge is a hierarchical system which includes: a philosophical, common scientific, specific scientific, and technological levels. Let us consider the methodological system components that are applied in modern pedagogy and scientific pedagogical research.

The philosophical methodology includes approaches (principles): objectivity, clarity, consistency and historicity, subjects' activity in understanding and transforming objects, affiliation with practice, determinism, isomorphism, ascent from the abstract to the concrete, systemic approach. Specific approaches that are used in pedagogy are the principles of optimality, optimization, adaptation, and interval.

System principle is used to build different models of pedagogic systems that reflect its characteristics: the completeness of components, their order, a set of links (direct, reverse), multi-level and multi-dimensional structure. These characteristics should be supplemented with new ones, namely: optimality, adaptability, interval.

The essence of the optimality principle in pedagogy (by S.U. Goncharenko) is to achieve, by a student or a teacher, maximum cognitive or educational effects with minimum cost of material resources and effort (criteria) for a limited time (limit). Therefore, the principle of optimality requires the implementation of the optimization problem formulation for a teaching object - the definition of optimality criteria and restrictions. For example, T.V. Lavrik defines the optimization object as the system of distance training of university undergraduates; the optimality criteria - the

ability to self-organization and self-management, the quality of knowledge and skills in the disciplines of professional cycle; and the limitations – active work time with teaching materials on the computer [5].

Comparison of two formulations of optimization problems shows that time is the limitation; one of the criteria is the desire to maximize the training effect; the difference is in the second criteria: according to S.U. Goncharenko, criterion tends to the minimum value, while by T.V. Lavrik – to the maximum. From our point of view, if the criteria have different directions (max, min), it is more difficult to achieve consensus in solving optimization problems in social area. In this case, the second criterion should be considered as a limitation. It is a decision taken in the process of the facility optimization in technical area (T.O. Dmitrenko).

Comparison of optimality and optimization principles shows that the first one is directed to a system and requires the determination of criteria and constraints. The principle of optimization, unlike the first one, is aimed at the achievement of the optimum system. Principles of optimality and optimization are related to the law by which the system tends to reach an equilibrium, and this state is an extreme (V.A. Oleynikov).

The principles of optimality and optimization are realized according to a set of rules:

1. Analysis of the situation and definition of the characteristics of the educational system.
2. Justification of optimality criteria and restrictions.
3. Development of pedagogical conditions of optimization, taking into account the characteristics of the educational system, criteria, and restrictions.
4. Clarification of educational system components in accordance with optimization of educational conditions.
5. Development of a model of the pedagogical process with key components: target; factors that affect the educational system; contradictions that arise under the influence of the factors; mechanisms that reduce action of contradictions; stages of educational technology; facilities that are used in each stage; results.

Optimization of the educational system for the selected criteria and restrictions is a condition for increasing the efficiency of the pedagogical process. An analysis of all above rules shows that they can be divided into two groups: the first and the second rules are relate to the implementation of the principle of optimality, the rest - to the optimization principle. All the rules are an algorithm for solving the optimization problem, while the first two being a statement of the problem.

Let us consider the second specific principle - the principle of adaptation. This term usually refers to the area of biology in which the process of adaptation is the adaptation of the structure and functions of the body and its organs to the environmental conditions. However the concept of adaptation is used not only in the natural sciences but also in the humanities, in particular, when matter concerns human adaptation to the environment. In engineering sciences (engineering cybernetics), adaptation is interpreted as the ability of technical devices or systems to adapt to the environmental conditions that change, or (and) their internal changes, thereby increasing the efficiency of their operation. Cybernetician L.P. Krayzmer considers adaptation broadly as the process of changing properties of the system, allowing it to reach a certain, often optimal, or at least satisfactory operation under initial uncertainty and external conditions that change [12]. Under the systems' properties, the author understands its susceptibility to external influences, some of the parameters, structure, and functioning algorithm. It is significant that the author notes the relationship between adaptation and optimization. In our opinion, adaptation is a process that changes the parameters, structure, and algorithm. This process can be run well if the criteria reaches the optimum value under certain restrictions.

Developing the concept of adaptation at the interdisciplinary level, V.I. Shkinder formulates the following definition: "Adaptation is an addressed system interoperability of different levels, in which there is an exchange of matter, energy and information, and their mutual enrichment and development" [13, p. 48-59]. The analysis shows that this definition is specifically designed for systems of any nature, hierarchy levels, resources, along with the guidance for the enrichment and development of systems that adapt.

We believe that L.P. Krayzmer and V.I. Shkinder considered those systems as one-dimensional. When it comes to adapting the educational system, it should be studied as a three-dimensional (organization, management, communication), whose main resource is information, and a result is an adaptation (suitability) to external and internal influences.

The above three types of adaptation definitions are designed to the following levels of abstraction: the empirical (in biology - adaptation of the organism to environmental conditions); theoretical (in cybernetics - changes in the system properties during its operation: parameters, structure, algorithm); methodological (the adaptation of a multidimensional, hierarchical system of any nature to external and internal influences). Empirical definitions are based on facts, theoretical - on algorithms of functioning, and methodological - on system models.

Thus, depending on the level of abstraction, we have three definitions to adapt the educational system:

- empirical - adaptation to external influences on the part of the objective and subjective factors, as well as internal - personal and human factors - in order to overcome the contradictions and improve the efficiency of the pedagogical process;

- theoretical - adaptation to internal and external impacts through changes in structure and functions of the system and its components to increase the efficiency of the pedagogical process;

- methodological - adaptation that occurs through integration of subsystems of the organization (impact on the personalities of the subjects), management (impact on the subjects' activity), and communication with the joint productive activity to improve the efficiency of the pedagogical process.

The principle of adaptation is associated with such laws:

- universal - any system is aimed to maintain the dynamic equilibrium by resisting internal and external factors, and this condition can be optimal;

- general - any system adapts to the impacts (internal, external) by changing the structure, function, and operation algorithm;

- private - educational system adapts to changes in the objective, subjective, personal, and human factors through a corresponding organization as an impact on a person (system-forming factor in the indicative stage of technology), management of subjects (system-forming factor at the stage of knowledge and transformation of objects), and communication with joint productive activity of the subjects at the stage of monitoring and reflection.

Application rules for the principle of adaptation:

1. To carry out the differentiation of the educational system into three subsystems: organization, management, and communication.

2. To consider the impact of factors (objective, subjective, personal and human) on the subsystems of the organization, management, communication and to reveal contradictions.

3. To carry out the integration of educational systems based on specified criteria and restrictions as conditions for continuous pedagogical process with the following stages: indicative, informative and transformative, and check-reflexive.

Adaptability of the educational system is seen as the ability to maintain an efficient (optimal) state of functioning in accordance with the criteria and restrictions by a change in the structure and functions (system, subsystems) that are under the influence of objective, subjective, personal, and human factors.

The Psychology Dictionary defines adaptability as the functioning tendency of a targeted system, i.e., a correspondence between the objectives and the achieved results (equilibrium - homeostasis, enjoyment, practical benefits, success) [14, p. 11-12].

The principles of systematic, structural and functional completeness, optimality, optimization, and adaptation are linked as they are designed to deal with complex systems which components are people, that is, coherent, purposeful. Adaptation should be considered as a means of optimization, while optimization is a special case of adaptation, where the result of the process is the best available system functioning for present conditions. Educational system usually aims to achieve planned results, so it can be considered as adaptive.

In the second half of the 20<sup>th</sup> century, a philosopher F.V. Lazarev substantiates the principle of interval approach associated with the consideration of complex systems of various nature by building their models. The scientist proves the need for a new principle for the achievements of physics at the beginning of the 20<sup>th</sup> century (quantum-mechanics). F.V. Lazarev introduces the concept of the interval approach which not merely captures one side or another of the object, but, within the interval, the object is an integrity – a "possible world" in the structure of reality which determines the existence of the object as a "partial" in a particular embodiment of its actualization

[15, p. 127]. Any object may be considered as a one-dimensional by using the concept of the "interval"; a set of models, developed at certain intervals and form a model of the object.

Application rules for the principle of intervals in the study of the educational system considered a multi-dimensional (multi-interval):

1. To present the educational system as a collection of organizational, management and communication subsystems.
2. Subsystems of the educational system are considered as intervals.
3. At each interval, a subsystem of the educational system is an integrity with all components and relations that perform the corresponding functions.
4. Integration of subsystems takes place on the basis of providing a holistic pedagogical process aimed at achieving the goal which consists of indicative, cognitive and conversion, control and reflexive stages.

### **Conclusion**

1. Structure of the pedagogical principles consists of a set of paradigms (knowledge, cultural, humanistic, managerial, communication and social, societal, anthropocentric, technological); an object (a person of any age); a subject (a pedagogical system as a condition for the pedagogical process realization); common principles (objectivity, clarity, historicity and consistency, subjects' activity in understanding and transforming objects, practice relations, determinism, isomorphism, ascent from the abstract to the concrete, systemic); approaches (systemic, culturalological, humanistic, cybernetic, social and communication, technological); specific principles (interval, optimal, optimization, adaptation) and methods (simulation of pedagogical objects, statistical methods); pedagogical technology (a set of pedagogical process steps and corresponding facilities).

2. Paradigmatic aspect of learning the foundations of pedagogy showed that paradigms carry out the information function through the connection with factors (objective, subjective, personal and human); instrumental function - through the connection with approaches; technological function – through the connection with principles and rules. Consequently, the management paradigm is associated with paradigms of optimization and adaptation, cybernetic approach (optimal control, adaptive control), principles of optimality, optimization and adaptation, as well as the relevant regulations.

3. A study of the methodological aspect of the pedagogical foundations gives an opportunity to develop components of the methodological system that include philosophical and specific principles as well as characteristics of the educational system: the completeness of the components, their order, a set of relationships and their direction (forward, backward), multilevelness, multidimensionality, optimality, adaptability, interval, and harmony.

4. The principle of optimality is aimed at the system (optimal educational system as a condition for achieving effective educational process) and requires the creation of its models, study of the criteria and restrictions. The principle of optimization is aimed at the process of achievement of system's optimality. Rules for implementation of the principles have been developed: the principle of optimality requires an analysis of the situation (peculiarities of the educational system and the industry specifics in which professionals work), substantiation of the criteria, restrictions; the principle of optimization is realized by such rules: the development of pedagogical conditions of optimization, specification of components of the pedagogical system, the development of the model of the pedagogical process and its implementation in practice.

5. The adaption in pedagogics is considered as a three-dimensional object (levels: empirical, theoretical, technological). The principle of adaptation is associated with the universal, general, and special laws; the rules for application of the adaptation principle in pedagogy have been formulated; the definition of the educational system adaptability has been developed.

6. The rules for the application of the Lazarev's principle of intervals for complex pedagogical objects (for example, the educational system) have been grounded. The essence of the principle of intervals is that the subsystems of the educational system (organization, management, and communication) are considered at each interval as an integrity; their integration is to ensure the integrity of the pedagogical process.

Further studies towards the development of the modern pedagogy foundations will be conducted with the help of signs and symbols and managerial aspects of their consideration.

**References:**

1. Hessen, S.I., Basics of Pedagogy. Introduction to Applied Philosophy / Editor and comp. P.V. Alekseev. M.: "Shkola-Press", 1995. 448 p.
2. Ukrainian Pedagogical Dictionary / S.U. Goncharenko. Kyiv, "Lybid", 1997. 374 p.
3. Bespal'ko, V.P., Comformable to Nature Pedagogy. M.: Narodnoe Obrazovaniye, 2008. 512 p.
4. Aleksyuk, A.M., Pedagogy of Higher Education in Ukraine: History. Theory / A.M. Aleksyuk. Kyiv, "Lybid", 1998. 558 p.
5. Lavrik, T.V., Pedagogical Conditions of Optimization of Distance Learning Bachelors in the Field of "System Sciences and Cybernetics" in the University / T.V. Lavrik: Dissertation of candidate of ped. sciences: 13.00.04. Zaporizhzhya, 2013. 258 p.
6. Dictionary of Pedagogy / Auth.-comp. V.A. Mizherikov; ed. by P. I. Pidkasisty. M.: TC Sphere, 2004. 448 p.
7. Bordovskaya, N.V., Pedagogy. Manual for High Schools / N.V. Bordovskaya, A.A. Rean. SPb.: Publishing house "Peter", 2000. 304 p.
8. Dmitrenko, T.O., Educational System: Structure and Functioning Laws / T.A. Dmitrenko // The Conceptual Apparatus of Pedagogy and Education: Scientific Publications. Ekaterinburg, 1996. Vol. 2. P. 68-80.
9. Dmitrenko, T.O., The Paradigm of Governance as the Basis of Educational System Components' Design / T.O. Dmitrenko, A.I. Prokopenko, Y.V. Yaresko // Bulletin of the Kharkiv State Academy of Culture. 2009. Vol. 27. P. 188-200.
10. Dmitrenko, T.O., Fundamentals of Modern Pedagogy: Social Communication Aspect of Research / T.O. Dmitrenko, Y.V. Yaresko // Bulletin of the Kharkiv State Academy of Culture. 2013. Vol. 39. P. 220-223.
11. Dmitrenko, T.O., The Methodology of Pedagogy: Characteristics, Definition / T.O. Dmitrenko, Y.V. Yaresko // The Conceptual Apparatus of Pedagogy and Education: Scientific Publications. - Ekaterinburg, Publishing house "CB-96", 2010. Vol. 6. P. 64-71.
12. Krayzmer, L.P., Cybernetics: Sc. Publications / L.P. Krayzmer. M.: Economics, 1977. 279 p.
13. Shkinder, V.I., About Descriptive Apparatus of Scientific Concepts of Pedagogy // VI Shkinder. / The Conceptual Apparatus of Pedagogy and Education: Scientific Publications. Ekaterinburg, 1996. Vol. 2. P. 48-59.
14. Psychology. Dictionary / Ed. by A.V. Petrovsky, M.G. Yaroshevsky. 2nd ed., rev. and add. M.: Politizdat, 1990. 494 p.
15. Lazarev, F.V., Philosophy: Textbook / F.V. Lazarev, M. K. Trifonov. Simferopol: Sonata, 1999. 352 p.



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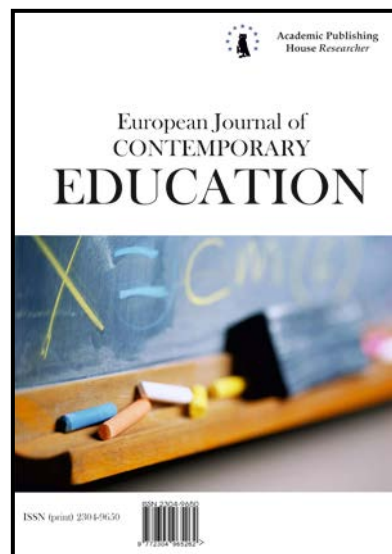
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## **Media Stereotypes Analysis in the Classroom at the Student Audience**

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### **Abstract**

Media Stereotypes Analysis is the identification and analysis of stereotypical images of people, ideas, events, stories, themes and etc. in media texts. Media stereotype reflects the well-established attitudes towards a particular object, it is schematic averaged, familiar, stable representation of genres, social processes / events, ideas, people, dominate in the media texts, designed for a mass audience. The plot and genre structure in media texts has specific stereotypes: fable situations of a media text action (scene, historical period, etc.) characters, their values, ideas, language, facial expressions, gestures, clothing, image pickup, etc.

**Keywords:** media stereotypes analysis, media, media texts, media education, media literacy, media competence, students.

### **Introduction**

Media Stereotypes Analysis is the identification and analysis of stereotypical images of people, ideas, events, stories, themes and etc. in media texts. Media stereotype reflects the well-established attitudes towards a particular object, it is schematic averaged, familiar, stable representation of genres, social processes / events, ideas, people, dominate in the media texts, designed for a mass audience. In this case I use approaches of media scholars and media educators and my own development [BFI, 1990; Silverblatt, 2001; 2014; Fedorov, 2004, p.43-51; Fedorov, 2006, p.175-228; Potter, 2014]. The plot and genre structure in media texts has specific stereotypes: fable situations of a media text action (scene, historical period, etc.) characters, their values, ideas, language, facial expressions, gestures, clothing, image pickup, etc.

### **Materials and methods**

Analysis of the structure of the general subject of media stereotypes in the students classroom is based on the generalized maximum concentration of major events: in a media text character's actions in certain conditions of life; once their everyday life is disrupted (accident, serious illness, a big win in the lottery, etc.), and they are trying to restore the stability of their world:

- the structure of the story stereotypes of media texts' melodramatic genre: meeting of male and female characters, mesalliance, jealousy, fight disease character (s) for their love wedding / love harmony;

- the structure of the story stereotypes of media texts' comedy (with a focus on adventure theme): naive, financially needy character and clever (sometimes criminal) rich character; naive hero (or rich character) finds himself in a funny and sometimes dangerous situations overcoming difficulties, but character receives the final award (respect for others, money, etc.);

- the structure of the story stereotypes of media texts' comedy (with a focus on the love theme): poor girl, a rich man, poor girl meets rich man with funny / eccentric circumstances, a mesalliance in a series of funny / eccentric situations, characters overcoming obstacles to love wedding / love harmony, colored light humor;

- the structure of the story stereotypes of the detective genre: police officer traveling by car, criminal offender commits robbery, murder or other crime of violation of the law investigation, police officer catches / kills the offender;

- the structure of the story stereotypes of the thriller: civilians and maniac, the maniac commits a series of murders violation of the law, the life of every peaceful character threatened persecution, anti-maniac strong character arrests / kills of the maniac, and people return to civilian life;

- the structure of the story stereotypes of western /cowboys' media texts: civilians and bandits (or Indians), bandits (or Indians) attack civilians, but noble cowboy protecting civilians, he arrests / kills the bandits or Indians, and civilians return to ordinary life;

- the structure of the story stereotypes of fantastic genre: earthlings and aliens, the aliens' invasion, the violation of ordinary life, the earthlings arrest / kill the aliens, or the aliens back to their planet;

- the structure of the story stereotypes of horror: monster attacks on civilians, but the brave hero arrests / kills this monster; the restoration of peaceful life;

- the structure of the story stereotypes of the musical: young character (male or female), endowed with musical / choreographic talent, dreams of glory and victory in the music / dance competitions; young character (male or female) meets an influential mentor / patron, but he /she feels the discomfort of glory (star fever, envy of others, the failure of the vocal cords, and trauma etc.), young character (male or female) struggles against this obstacles; the final musical triumph of character;

- the structure of the story stereotypes of media reality show: participants of reality shows, at all times during the show the characters being telemonitoring, and they have a variety of difficulties (physiological, moral, intellectual, etc.) associated with the execution of tasks for winning the prize; most of the characters out of the game and returned to her normal life. But one character / small group of characters wins / receives coveted prize;

- the structure of the story stereotypes of media game shows: the players try to find the answer for the questions / tasks; the players have the various difficulties (physiological, moral, intellectual, etc.) on the way to the prize, most of the characters out of the game and return to their normal lives. One player / small group of players wins / receives coveted prize;

- the structure of the story stereotypes of media texts talk show: participants of talk show and TV host, he asks participants about the problems (social, moral, political, sexual, aesthetic and other topics). There is controversy between the some people in the talk show. TV host tries to find the constructive outcome of controversy and / or analysis of the final online survey of audience;

Analysis of media text's stereotypes also involves working not only with the plot schemes, but also the identification of typical fable situations, places, actions, objects, historical period, the characters, their values, ideas, facial expressions, gestures, clothing, receptions action pictures, etc. And students can analyze the manifestation of genre's stereotypes on examples of specific media texts of different genres.

Analysis of media text' stereotypes implies a number of creative tasks for students [BFI, 1990; Semali, 2000, pp.229-231; Fedorov, 2004, p. 43-51; Fedorov, 2006, p. 175-228, but I substantially supplemented and revised the cycle tasks]: literary and analytical, drama, role-playing, simulation. Each of these tasks include the analysis of key concepts of media (*media agencies, media categories, media language, media technologies, media representations, media audiences*).

*Cycle of literary and analytical creative tasks on the subject of media text' stereotypes in the classroom at the student audience:*

*Media agencies:*

- identification of a media agency's stereotypical traits focused on political functions in modern society;
- selection of the stereotypical traits of media agency, focused on entertainment features in modern society.

*Media / media text categories:*

- selection of media texts (from the proposed list) into different genres and themes;
- selection of stereotypical media personalities (from the proposed list) on the basis of their best-fit specific themes and genres.

*Media technologies:*

- identification of stereotypical technologies for creating certain types of media texts.

*Media languages:*

- identification of stereotypical audiovisual solutions for the creation of media texts of certain types and genres.

*Media representations:*

- analysis of media text on a historical theme, based on documentary evidence. The study of regional geographic, political and historical materials relating to the subject and the time period. Comparison of the studied material depicting historical events in a particular media text; identification of media stereotypes of images of the country, people, race, nationality, social structure, political governance, the justice system, education, employment, etc.;

- modeling (in tabular / structural form) of plot stereotypes of media texts, based on the structure of many media texts' storylines: the hero / heroine, a world in which the characters live; integrity of this world is broken or changed, and the hero / heroine must restore its integrity. Analysis of genre stereotypes - plot schemes, typical situations, characters, their values, ideas, facial expressions and gestures, clothes, objects, places, actions, etc.;

- selection of media text on the stereotypical story blocks; attempt to interchange these blocks, and thus change the course of events;

- selection of stereotypical "rhythmic blocks" in the media texts of "novelistic character" - given the fact of the rhythm of media texts (balance of the epic scenes and intimate chamber scenes);

- selection of media critics' thesis, faithfully reflects the ideas of the authors of a media text;

- viewing, reading of the first (or final) episode of a media text, followed by an attempt to predict the future (past) events;

- drawing up the story on behalf of stereotyping (main or secondary) character of media text: preserving the features of his character, vocabulary, etc.;

- writing the story for media text from a character's name;

- location of stereotypical character of a media text in changing situation (with a change of name, genre, time, place, action of media text, its composition: strings, climax, denouement, epilogue, etc. ; age, gender, nationality of a character, etc.);

- the analysis of promotional posters of media texts (visual and written information, the most important part of this information, indicate the genre stereotypes media text, composition posters);

*Media audiences:*

- to try to discover the essence of the mechanism of "emotional pendulum" [alternation of episodes that cause positive (joyful, cheerful) and negative (shock, sad) emotions of the audience, that is, relying on psycho-physiological side of perception];

- prediction of the success of the media text.

*Cycle theatrical role-creative tasks for the analysis of media stereotypes in the classroom at the student audience:*



*Media agencies:*

- the role game: the stereotype stages of a film or television (the various stages of preparation and film-making process, including financial calculations, casting and signing of contracts);
- the role game "press conference" with "authors' media text" ("screen writer", "producer", "director", "actors", "cameraman", "composer", "artist"). "Journalists" ask in advance prepared questions relevant to media stereotypes; "authors" answer these questions.

*Media / media text categories:*

- the role game: to use the same stereotyped plot in various genres (comedy, drama, detective, and so on.).

*Media technologies:*

- the role game: the creators' dispute about which technologies can be used in media text.

*Media languages:*

- the role game: the creator's discussions about what specific codes (signs, symbols, etc.) should be used in the media text.

*Media representations:*

- the role game: playing with stereotypical characters and situations: students play the roles of stereotypical characters in stereotypical plot situations of media texts ("teacher and student", "TV / radio host and guest star in studio", etc.). Work is proceeding in groups of 2-3 students. Each group prepares and puts into practice the game project (episode of a media text). The teacher acts as a consultant. The results are discussed and compared;

- the role game: interview (interview with stereotypical characters of media texts). Work is proceeding in groups of 2-3 students. Each group prepares and puts into practice the game project (interview). The teacher acts as a consultant. The results are discussed and compared.

*Media audiences:*

- the role game: the sketch on the theme of different audience's contact reactions (the audience has different age, education level, social status, etc.) with stereotypical media texts.

*Graphic-cycle simulation tasks for the analysis of media stereotypes in the classroom at the student audience:*

*Media agencies:*

- preparing drawings / collages on the theme of the creation of the stereotypical media texts.

*Media / media text categories:*

- preparing drawings / collages, which could clearly imagine the kind of stereotypical genre and media texts.

*Media technologies:*

- preparing posters (made in different techniques: drawing, collage, application, etc.) to the stereotypical media texts.

*Media languages:*

- Preparation of a series of frames / cards that could be used as a basis for the image of stereotypical characters in media text (with the support of the various types of crop - the general plan, close-up, detail, etc.).

*Media representations:*

- creation of a poster / collage / comics, which were presented to the stereotypical situations and characters of media texts.

*Media audiences:*

- creation of drawings on the theme of the representatives of the various types of audiences' reactions after contact with the stereotypical media texts of different genres.

*Questions for the analysis of media stereotypes in the classroom at the student audience* [Berger, 2005; Fedorov, 2004, p. 43-51; Fedorov, 2006, p. 175-228; Buckingham, 2003, p.54-60, Silverblatt, 2001, p.107-108]

*Media agencies:*

Can you think of stereotypical features of media agency / media holding (newspaper, television, cinema, Internet, etc.)?

*Media / media text categories:*

How conventions and codes work in stereotypical media texts of various genres and thematic?

Whether a particular media text belongs to any known genre? Is there a predictable genre formula? As understanding of this formula helps your perception of a particular media text?

What is the function of genre formula media text?

How genres' stereotypes of media texts affect the audience' cultural attitudes and values, cultural mythology?

Is it possible to trace the evolution of a particular media text genre's stereotypes?

Is it possible to trace the evolution of a particular media text topics' stereotypes?

How these stereotypical genres / themes say about the transformations in the culture of the society?

What stereotypical stories, storylines conventions specific to genres / themes?

Can you articulate for the stereotyped patterns of ties genres / themes?

*Media technologies:*

Is it possible to see the stereotype technological solutions in media texts?

*Media languages:*

Is it possible to see the stereotypes in media text visual solutions? If so, what exactly?

Is it possible to see the stereotypes sound decisions in a media text? If so, what exactly?

*Media representations:*

As media texts represent certain social groups? Are these representations are accurate?

If you are asked to select ten of media texts that could tell about aliens (or foreigners), which would you choose? Why these media texts? What political, social and cultural stereotypes displayed in the media text? Are there visible signs of deviant behavior, sexism, conformity, anxiety, stereotyped thinking, conflict of generations, etc.?

*Media audiences:*

Why the audience takes some stereotypical media representations as true and reject others as false?

Can there be different interpretations of media texts and their stereotypical characters? Or stereotype initially involves the same interpretation of media texts?

What groups of modern society media stereotypes affect the most? Why?

Is it possible to get rid of the impact of media stereotypes on society? Explain your point of view.

### **Conclusions**

In this article I presented the main path for the Media Stereotypes Analysis of media texts on media education classes in the university, including the examples of creative problems and issues associated with this type of this analysis in the context of media education problems, ie based on six key concepts of media literacy education: agency, category, language, technology, audience, representation. I suppose that the Media Stereotypes Analysis of media texts on media education classes can significantly develop media competence of students, including critical thinking and perception.

### **References:**

1. Berger, A.A. (2005). *Seeing is believing. Introduction to visual communication*. Moscow: Williams, 288 p.
2. Buckingham, D. (2003). *Media Education: Literacy, Learning and Contemporary Culture*. Cambridge, UK: Polity Press, 219 p.
3. Fedorov, A.V. (2004). Specificity of media pedagogical students // *Pedagogy*. № 4, p. 43-51.
4. Fedorov, A.V. (2006). Media Education: creative tasks for students and pupils // *Innovation in Education*. N 4, pp. 175-228.
5. Potter, W.J. (2014). *Media Literacy*. L.A.: Sage.
6. Semali, L.M. (2000). *Literacy in Multimedia America*. New York – London: Falmer Press, 243 p.
7. Silverblatt, A. (2001). *Media Literacy*. Westport, Connecticut – London: Praeger, 449 p.
8. Silverblatt, A. (Ed.). (2014). *The Praeger Handbook of Media Literacy* (in 2 volumes). Santa Barbara, California and Oxford, England: Praeger.



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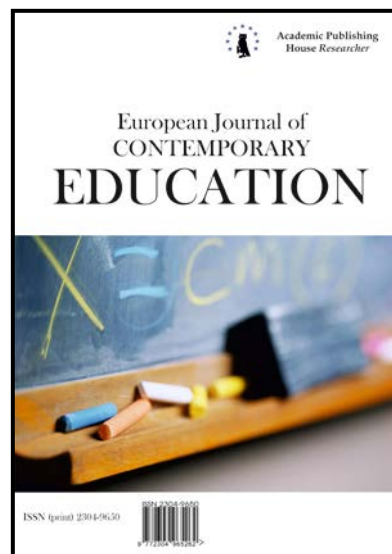
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### **Integrated Prevention of Social Dependencies in Adolescents through the Scenario Method**

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#### **Abstract**

This article provides a rationale for the need to take an integrated approach to prevention of social dependencies in adolescents. Through this approach, the authors fine-tune the determination of the phenomenon of prevention of social dependencies. The authors bring to light the potential of the scenario method in resolving the above objective. The authors describe the theoretical and practical aspects of scenario planning, concretize its objects, and provide a rationale for the method's effectiveness in studying the processes of origination and operation of social dependencies in adolescents and projecting the process of their prevention. The authors propound a scenario-planning algorithm. The authors identify and describe model scenarios for the origination of social dependencies in adolescents: "Dependency as an outcome of interaction with an asocial group/person", "Dependency as a response to a provocation", "Dependency as a means of deriving pleasure", "Dependency as a way to escape one's life problems", "Dependency as an outcome of the change of a constructive way of interacting with the object of dependency to an unconstructive one", and "Dependency as a way to express the adolescent's protest"; the authors determine unproductive stratagems for these scenarios. The authors identify the mechanisms underlying the origination of dependency: "the motive-to-goal shift", emotional-positive

conditioning, social contagion, substitution, compensation for negative emotions, and unblocking.

The authors classify by the degree of productivity and correlate with behavioral adolescent scenarios model plots and social-pedagogical scenarios for the interaction of pedagogues and parents in resolving objectives in integrated prevention of social dependencies.

The authors provide plots and scenarios for the interaction of pedagogues and parents within the “field of cooperation”, “field of building up cooperation potential”, and “field of alienation”. The authors provide recommendations on pedagogues’ and parents’ use of forestalling and correcting scenarios in respect of model scenarios for the origination of dependencies generated by adolescents.

If implemented in the practice of preventive work at educational and social institutions, the material presented in this article may help boost the effectiveness of work on forestalling dependent behavior in adolescents in respect of various objects of reality.

**Keywords:** social dependencies in adolescents, integrated approach to prevention of social dependencies, scenario method, scenarios for the origination of social dependencies, social-pedagogical scenarios.

### **Introduction**

Over the last few decades, social dependencies have become an increasingly common phenomenon in the adolescent environment and are becoming a major barrier to socialization by adolescents. Today we are dealing with an ever-widening spectrum of objects of dependency (alcohol, nicotine, game, computer, and TV dependencies, Internet dependency, shopoholism, mobile dependency, technomania, fanaticism, etc.) and their negative impact on the personality of adolescents and their immediate entourage. Traditional approaches towards forestalling social dependencies are normally based on identifying the ins and outs of specific dependencies and seeking prevention methods relevant to them. The growing spectrum of adolescent dependencies and the general nature of their origination reinforce the need for taking an integrated approach to their prevention, while the probabilistic character of their origination and entrenchment and the dynamic changeability of parameters with the availability of certain generic models substantiate the effectiveness of applying the scenario method in exploring the mechanisms underlying the origination of dependencies and developing ways of preventing and correcting them.

### **Materials and methods**

The general theoretical-methodological basis for developing an integrated approach to prevention of social dependencies in adolescents is formed by a number of psychological theories of addictive behavior mechanisms (V.D. Mendeleovich [2], D.V. Chetverikov [3], M.K. Akimova, M.N. Ustseva [4], M.A. Martin [5], I.Y.H. Ng [6], etc.); studies related to prevention of drug addiction, smoking, alcohol abuse, Internet dependency, game dependency, and other social dependencies (V.N. Druzin [7], T.P. Zharikova [8], O.V. Zavalishina [9], K.S. Lisetsky [10], O.B. Simatova [11], V.A. Frolov [12], and others); studies related to the conceptual filling of the socio-cultural context of formation of one’s spirituality (K.I. Pargament [13]).

To explore the processes of origination and operation of social dependencies in adolescents, the authors employ the methods of imitational modeling and scenario planning, which help identify model scenarios and bring to light general mechanisms for the origination of social dependencies.

In developing our scenario method as a method for preventing social dependencies, we have relied on the scenario approach to psychological-pedagogical and economic studies (E. Berne [14], R.M. Nizhegorodtsev [15], S.A. Popov [16], A.N. Safronova, N.O. Verbitskaya [17], Yu.S. Tyunnikov [18], and others).

Our methodology for scenario planning is based on conceptual tenets and principles featured in the study “An Integrated Approach to Prevention of Social Dependencies in the Adolescent Environment” [19].

### **Discussion**

*Prevention of social dependencies in adolescents* implies a set of pedagogical activities aimed at forestalling and minimizing the risks of origination of social dependencies; identifying the reasons and conditions for deviations in the behavior of adolescents which increase the risk of

origination of social dependencies; seeking and applying various ways and methods to prevent and avert unconstructive adolescent behavior in respect of objects of dependency.

Analysis of the display of various social dependencies in adolescents and analysis of the practice of correctional and preventive work and relevant scientific literature indicates that taking an integrated approach to prevention of social dependencies works best using the scenario method, which is based on identifying general mechanisms and model scenarios for their origination and developing uniform correctional and preventive scenarios.

We propose the following *scenario planning objects* for the process of preventing social dependencies in adolescents:

- 1) behavioral adolescent scenarios in respect of the object of dependency;
- 2) behavioral adolescent scenarios in respect of the subject of prevention (pedagogues, parents);
- 3) behavioral pedagogue scenarios which facilitate or impede the origination and entrenchment of social dependencies in adolescents;
- 4) behavioral parent scenarios which facilitate or impede the origination and entrenchment of social dependencies in adolescents;
- 5) social-pedagogical scenarios generated by school pedagogues with a view to forestalling social dependencies in adolescents;
- 6) social-pedagogical scenarios generated by parents with a view to forestalling social dependencies in adolescents;
- 7) scenarios for the interaction of parents and school pedagogues in pursuing preventive goals.

The use of the scenario method in resolving objectives in prevention of social dependencies in adolescents is effected using the following *algorithm*: 1) determination of the object of strategizing; 2) analysis of the baseline situation (extraction of key issues and identification of factors that must be taken into account in strategizing); 3) identification of the model plot (the baseline and normative situations); determination of the trajectory of the shift from the baseline situation to the normative-value situation; determination of co-subordinate goals in the development of institutional interaction; 4) construction of a scenario for resolving issues (determination of the role positions of the participants in institutional interaction; determination of the meanings, values, and stratagems of the interaction participants; determination of effective governing impacts).

One of the crucial aspects of prevention of social dependencies is the study of the process of their origination in the consciousness and behavior of adolescents. ***The origination of social dependencies in adolescents*** can take place under six model scenarios [20, 21]:

***Scenario 1. Dependency as an outcome of interaction with an asocial group/person.*** This scenario is launched by the adolescent's aspiration to match his/her entourage, oppose them in no way, and be accepted within the reference group. Social dependency is formed here as a consequence of seeking reference objects (groups, particular persons) and joining a referent group of asocial orientation, where dependent behavior is a way to achieve and maintain acceptance within the group.

***Scenario 2. Dependency as a response to a provocation.*** This scenario is predicated on the curiosity of the adolescent, his/her desire to experience new sensations. When an underage person gets in a provocative environment which lures him/her into "meeting" the object of dependency, he/she grows willing to personally perceive the attractive aspects of interaction with that object and next, through trying it, master new behavior models. Gradually, the adolescent loses control of the interaction with the object of dependency.

***Scenario 3. Dependency as a means of deriving pleasure.*** The reason behind the origination of social dependency in adolescents under this scenario is a distorted system of values, in which deriving pleasure prevails over self-actualization. The adolescent does not enjoy the types of activity which used to make life exciting before, make him/her happy, or allay "boredom". Here, new addictive trials are permeated with the desire and aspiration to experience vibrant sensations and a special pleasure, get one's spirits up, have fun, jolt oneself out of the "dull greyness" of life. At some point, the adolescent realizes the possibility of using one of the objects to derive pleasure and poly-addictive trials, consequently, are followed by the choice of one object – the object of entrenched dependency.

**Scenario 4. Dependency as a way to escape one's life problems.** Under this scenario, social dependency originates as a result of the adolescent's unpreparedness to cope with life's difficulties. In complicated life situations, one chooses strategies to avoid contact with reality or escape resolving issues. One's escape into dependency functions as a compensative mechanism.

**Scenario 5. Dependency as an outcome of the change of a constructive way of interacting with the object of dependency to an unconstructive one.** The cause behind the origination of social dependency under this scenario is one's lack of skill in projecting one's interaction with the object of dependency and foreseeing its possible negative effects. First the adolescent builds constructive ties with the potential object of dependency. At some point, one discovers other attractive ways to interact and then gradually loses control over one's behavior, and the latter takes on the characteristics of dependent behavior.

**Scenario 6. Dependency as a way to express the adolescent's protest.** Under this scenario, the adolescent has a negative or opposing attitude towards his/her closest social entourage, is not willing to adapt to reality, and takes out his/her attitude towards a parent or a teacher on the entire moral-esthetic coordinate system provided by them.

The dependency origination *mechanisms* common to the above scenarios are the "motive-to-goal shift", emotional-positive conditioning, social contagion, substitution, compensation for negative emotions, and unblocking.

The process of putting together preventive work with adolescents through the scenario method involves analysis of behavioral scenarios generated by them and arrangement of relevant social-pedagogical scenarios.

**Behavioral adolescent scenarios** can be nominally divided into four groups: unproductive, lowly productive, moderately productive, and highly productive. Incipient social dependencies are reinforced in adolescents by unproductive and lowly productive scenarios. Unproductive scenarios include the "Confrontation" and "Ignoring" scenarios, and lowly productive – "Pseudo-cooperation" and "Attracting attention through inadequate ways".

**Social-pedagogical scenarios** can be differentiated into *counter-scenarios*, which are aimed at complete neutralization of active adolescent scenarios; *correctional scenarios*, oriented towards pedagogical correction; *developing scenarios*, associated with the development of active adolescent scenarios and actualization of their positive aspects; *reinforcing scenarios*, aimed at entrenching active adolescent scenarios. An example of counter-scenarios could be "Shake-up", "Counter-provocation", "Dependency demotivator", and "Parent provocation". Correctional scenarios would be: "Don't let others control you", "Parity with others", "New outlook", "Unveil yourself", "Hidden undertone", or "From conflict to concord". Developing and reinforcing scenarios are "Sensible consumer", "Learn to enjoy life", "Problems as fate's challenges", and "Constructive interaction with the object of dependency".

Taking a scenario approach to prevention is based on identifying model scenarios for the origination of social dependencies in adolescents and selecting relevant scenarios for forestalling and correcting them. Thus, for instance, the scenario "Dependency as an outcome of interaction with an asocial group/person" could be matched with the forestalling scenario "Don't let others control you" and the correcting scenario "Shake-up". The behavioral adolescent scenario "Dependency as a response to a provocation" requires using the forestalling scenario "Sensible consumer" and the correctional scenario "Counter-provocation". Of a forestalling nature in respect of the scenario "Dependency as a means of deriving pleasure" is the scenario "Learn to enjoy life" and of a correctional nature is the scenario "Demotivator".

The effectiveness of preventive work largely depends on arranging the interaction between pedagogues and parents. Scenarios for such interaction can be arranged within the "field of cooperation", "field of building up cooperation potential", and "field of alienation". The "field of cooperation" is characterized by such plots as *cooperation and co-creation*, the "field of building up cooperation potential" – *adaptation, compromise, consulting, help and support, participation and engagement, agreements*, and the "field of alienation" – *dismissal, confrontation, pseudo-cooperation, counteracting*. "Field of alienation" plots can develop under scenarios for domination by the pedagogue ("Brainwashing", "Ignoring", "Misorienting the parents") or domination by parents ("Shunning responsibility", "Defying the school", "Parent Attack", "Horses in a single harness hurtling headlong into the abyss", "Swan, Crawfish, and Pike").

### **Results**

The authors have provided a rationale for the need to take an integrated approach to prevention of social dependencies in adolescents; brought to light the theoretical and practical aspects of putting such an approach into practice; identified the potential of the scenario method in preventing social dependencies; described addictive behavioral adolescent scenarios; identified unproductive stratagems for these scenarios; proposed scenarios for the pedagogical interaction of teachers and parents in resolving objectives in prevention of social dependencies in adolescents.

### **Conclusion**

Scenario planning is a universal instrument that helps implement the imitational modeling of the processes of origination and entrenchment of social dependencies in adolescents and their prevention. When developing strategy and tactics for preventing social dependencies in underage individuals, it is important to determine baseline behavioral adolescent scenarios, assess the risk of origination of dependencies, and put together relevant social-pedagogical scenarios.

The advantages of taking an integrated approach to prevention of social dependencies in adolescents through the scenario method over taking a traditional approach lie in that the former lets us identify the more sustainable, hence predictable, lines in the behavior of adolescents; overcome the rigidity, fixedness of psychological-pedagogical correction of dependent adolescent behavior, when organizers of preventive work, following traditional schemes, do not take account of the conditions for the origination of social dependencies and the special aspects of their entrenchment in adolescents.

### **References:**

1. Kahn, H. and A. Wiener, 1967. *The Year 2000: A Framework for Speculation on the Next Thirty-Three Years*. New York, NY: Macmillan, pp: 129.
2. Mendelevich, V.D., 2005. *The Psychology of Deviant Behavior: A Study Guide*. Saint Petersburg: Rech, pp: 445.
3. Chetverikov, D.V., 2002. *The Psychological Mechanisms and Structure of One's Addictive Behavior*, Doctor of Psychological Sciences thesis, Novosibirsk, pp: 385.
4. Akimova, M.K. and M.N. Ustseva, 2010. *The Impact of a Father and His Image on the Origination of Addictions in Adolescents*. *Vyssheye Obrazovaniye Segodnya*, 5: 63-67.
5. Martin, M.A., 2012. *Family Structure and the Intergenerational Transmission of Educational Advantage*. *Social Science Research*, 41(1): 33-47.
6. Ng, I.Y.H., 2012. *Parents' Psychological Self-Concepts and Children Issues in Low-Income Families in Singapore*. *Asia Pacific Journal of Social Work and Development*, 22(1-2): 50-62.
7. Druzin, V.N., 2012. *Pedagogical Prevention of Computer Addiction in Adolescents*. *Pedagogika*, 8: 14-23.
8. Zharikova, T.P., 2011. *Assessing the Effectiveness of the Resource Approach to Psychological-Pedagogical Prevention of the Factors of Risk of Addictive Behavior in Adolescence*. *Vestnik Samarskogo Gosudarstvennogo Universiteta. Gumanitarnaya Seriya*, 4(85).
9. Zavalishina, O.V. and Ye.A. Reprintseva, 2011. *Pedagogical Support for Adolescents Prone to Internet Addiction*, 2(18): 48-57.
10. Lisetsky, K.S., 2008. *Subjectness as the Psychological Basis for Prevention of One's Drug Addiction*. *Vestnik Samarskogo Gosudarstvennogo Universiteta*, 60: 320-329.
11. Simatova, O.B., 2009. *Coping Behavior Theory as the Basis for Primordial Psychological-Pedagogical Prevention of Addictive Behavior in Adolescents*. *Vestnik Zabaykalskogo Gosudarstvennogo Universiteta*, 6: 93-98.
12. Frolov, V.A., 2008. *Psychological-Pedagogical Aspects of Prevention of Addictive Behavior in Children and Adolescents (Factoring in the Special Aspects of the Addict's Self-Regulation in Developing Programs for Psychological-Pedagogical Prevention of Addictive Behavior)*. *Nauchnyye Problemy Gumanitarnykh Issledovaniy*, 11: 94-100.
13. Pargament, K.I., 2013. *Spirituality as an Irreducible Human Motivation and Process*. 23(4): 271-281.
14. Berne, E., 1995. *Games People Play. People Who Play Games*. Saint Petersburg: Spetsialnaya Literatura, pp: 399.

15. Nizhegorodtsev, R.M., 2002. *An Information Economy. Book 3: A Look behind the Looking-Glass: The Technical-Economic Dynamics of Russia's Crisis Economy*. Moscow-Kostroma, pp: Moscow, Kostroma, pp: 170.
16. Popov, S.A. *Scenario Modeling: An Eight-Step Methodology*. Accessed 3 September 2014. <http://gtmarket.ru/laboratory/expertize/2008/1800>.
17. Safronova, A.N. and N.O. Verbitskaya, 2014. A Scenario Approach towards Forecasting the Impact of the Educational Environment on the Display of Negative Inclinations in Students. *Sovremennyye Problemy Nauki i Obrazovaniya*, 2. Accessed 29 September 2014. [www.science-education.ru/116-12482](http://www.science-education.ru/116-12482).
18. Tyunnikov, Yu.S., 2012. Scenario Modeling of a Supplemental Professional Education Program. *Izvestiya Sochinskogo Gosudarstvennogo Universiteta*, 3(21): 166-173.
19. Vorobyova, S.V. et al., 2012. *An Integrated Approach to Prevention of Social Dependencies in the Adolescent Environment: A Monograph*. Under the scientific editorship of Maznichenko, M.A. and N.I. Neskromnykh. Sochi: RITs SGU, pp: 306.
20. Maznichenko, M.A. and N.I. Neskromnykh, 2013. Social Dependencies as the Object of Integrated Pedagogical Prevention. *European Journal of Contemporary Education*, 5(3): 148-161.
21. Maznichenko, M.A. and N.I. Neskromnykh, 2013. Scenarios for the Origination of Social Dependencies in Adolescents. *Narodnoye Obrazovaniye*, 7: 262-269.





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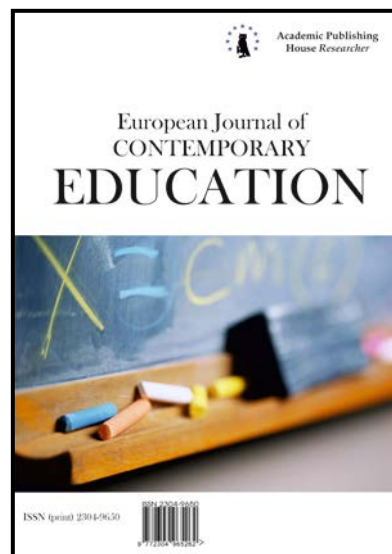
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## Standardization of Primary Education in Great Britain

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### Abstract

The article examines the standardization of primary education as one of the development trends of the British school at the present moment in the context of improving its efficiency and quality. It analyses the positive results of the standard-based reforms (modernization of primary education content, improvement of younger students' outcomes, expansion of school autonomy, professional growth of a primary school teacher) as well as negative ones (increased load for students and teachers, inadequate assessment system).

**Keywords:** primary education, educational standards, standardization, standard-based reforms, quality of education, National Curriculum, key stage, content and attainment standards, assessment, performance descriptors.

### Introduction

The standard-based educational reforms of the 1990s and at beginning of the 21<sup>st</sup> century were caused by the necessity to ensure efficiency, equity and quality of education in order to solve economic and social problems in the world and Europe in particular. The tendency of school autonomy expansion and desire to control the results of educational institutions also contributed to the introduction of educational standards which became the basis for internal and external evaluation of national education systems.

Being in constant development educational standards reflect the social ideal of education, educational requirements as the basis of social and cultural forming of younger generations, fulfilling stabilizing and regulatory functions with respect to the preservation of unified educational

space in the state. This multidimensional nature of standardization in education raises a number of specific pedagogical tasks and challenges not only for the European countries, but also at the global level.

### **Materials and methods**

In the context of the European education the concept of 'a single standard' is directly related to basic education which in most countries is carried out at primary and basic secondary school, mandatory and mass, and in most cases unified.

The main ideas on the creation of a common European standard in the field of education were presented in 'Council of Europe Resolution 1 on the European Dimension of Education: Teaching and Curriculum Content' (1991) which became a guide for the implementation of a unified policy in developing and implementing content standards in Europe [1].

The process of standardization was gaining momentum in the 1980-90s, when the dominant idea in developing school education in most European countries was to improve its quality and effectiveness. To achieve these goals the West European states were taking steps towards optimizing the school management, introducing content standards, establishing national systems for monitoring the quality of education, and implementing new educational technologies.

The main characteristics of the general concept of standardization of compulsory education are based on such fundamental pedagogical ideas as the theory of curriculum (K. Anderson-Levitt, B. Blum, J. Cohen, R. Gordon, B. Gundem, P. Hopman, J. McNeill, V. Pinar, V. Reynalds, P. Slattery, P. Taubman), the theory of lifelong education (G. Dave, P. Lengrand, D. Tenne), and the theory of key competencies (J. Gordon, G. Halasz, A. Hutorskoy, V. Kalney, N. Nikandrov, D. Pepper, S. Shishov, I. Zimnyaya).

Russian comparativist Vladimir Zagvozdkin, analyzing the examples of European national standards, concludes that the term *standard* primarily suggests the rate that can be obtained at different levels:

- at the level of common educational goals and values;
- at the level of competencies related to the specific subject area;
- at the level of learning objectives and content of education (content standards);
- at the level of performance that can be measured by testing (performance standards) [2, p. 286].

To formulate the mandatory educational objectives and determine the level of students' competence the best educational standards must possess such characteristics as objectivity (a particular subject training), focus (a focus on the key areas of study), being cumulative (a forming of competence over time), being obligatory for all (minimal results expected from each student), differentiation (determining the degree of competence above and below the minimum level), clarity (a clear definition of standards), and feasibility (realistic requirements for students and teachers) [2, p. 292].

European experts also point to the correlation between the concepts of 'quality' and 'standard'. The key elements covering the broad notion of 'quality of education' and constantly interacting are entrance conditions, context, process (organization), and standards [3, p. 74].

Speaking about the standardization in today's education researchers are operating with such terms as content and performance standards, learning and teaching standards, minimum standards and standard norm, competence standard, and learning environment standards.

Content standards and standards of achievement are increasingly considered to be the elements of 'from above' standardization, which has negative impact on standardization in primary education: early selection of students and neglect of dependence of learning outcomes on external factors (social, cultural, economic status of parents). In this context 'alternative standards' are becoming of particular interest. Their developers believe that the modern tendency to measure the quality of school results only by centralized tests is pedagogically and didactically counterproductive: the level of achievement in the 'performance standard' is determined without taking into account the significant differences in children's abilities. As a consequence, students who do not correspond to the measured parameters are out of position. Schools are beginning to work for the measured result, their educational objectives are narrowed, so the official standards

are opposed to 'process standards, conditions, and training opportunities' (opportunity-to-learn standards) [4, c. 152].

### **Discussion**

We are going to consider the peculiarities of introduction and results of standard-based reforms at primary school on the example of the system of education in Great Britain.

In the British system of education the concept 'standard' is used to denote the level attained by students, but not the expected level set by the curriculum.

The 1988 Education Reform Act led to the introduction of a national curriculum and a statutory assessment framework what happened for the first time in the history of the United Kingdom. The task of these papers was to standardize the basic education in England, Wales and Northern Ireland. National Curriculum was called to provide a wide, balanced and coordinated curriculum for children aged between 5 and 16, introducing such key stages in educating junior schoolchildren as KS 1 for children aged 5-7 years and KS 2 for children aged 7-11 years.

Developing the national educational standards the Ministry of Education and Science has set the following goals:

- to guarantee the right to education for all students regardless of their social status, culture, race, gender, disability, and differences in abilities;
- to set standards of achievement that are clear to students, parents, teachers, politicians, employers, and the public;
- to implement the principles of continuity and succession in the education system by introducing a national framework that promotes consistency of training programs and is flexible enough to ensure progress in the training of students;
- to promote public understanding and confidence in the performance of schools and compulsory education [5, c. 26].

The standard identified the list of mandatory subjects that should be studied by all students – 'core' subjects (English language and literature, mathematics, science) and basic subjects (art and design, technology, geography, history, ICT, music, physical education) [6, p. 25].

Each subject and KS has a content standard (programs of study) defining the knowledge and skills that student should acquire as well as standards of achievement (attainment targets), containing the assessment criteria for 8 levels of difficulty (level descriptions). Thus, at the end of KS 1 (7 years) the productivity of the majority of pupils should be within the range of 1 – 3 levels, and at the end of KS 2 (11 years), it should be within the range of 2 – 5 levels.

At the end of each key stage assessment of students' educational achievements is introduced (summative assessment). Its purpose is to provide teachers with summary data on the levels of students' achievements and diagnostic information for improving the planning and subsequent organization of training.

In 1997 after the victory of the Labor Party *'White Paper: Excellence in schools'* focused on raising the standards of language and mathematical literacy. By 2002 it was planned in the document to reduce the number of pupils (aged 5-6-7 years) in a class up to 30 persons, to introduce effective entrance testing for admission of children to primary school (baseline assessment), to ensure minimum 1 hour of literacy and numeracy during training at ISCED 1, to develop national guidelines and establish a system of teacher training for best practice of literacy and numeracy, and to considerably improve students' academic results at the end of primary education in accordance with the national objectives [7, p. 22].

A concrete step towards the realization of the announced in the 'White Book' goals was the introduction of the National Literacy Strategy (1998) and the National Numeracy Strategy Framework (1999) in primary schools. These programs provided teachers with a clear set of descriptors for measuring students' progress in language and mathematics.

The introduction of the national standards allowed the British primary school to make an educational breakthrough. For English, mainly reading, the results indicated that the percentage of children gaining a level 4 between 1995 and 2000 rose from 48 to 75 per cent. For mathematics the rise was from 44 to 72 per cent [8, p. 9].

After reviewing the National Curriculum in August 2000 all publicly funded primary schools in England introduced a framework for personal, social and health education (PSHE).

The framework described the expected skills and knowledge of younger students in these optional subjects leaving the details of the content and the choice of educational technology to schools [9, p. 7].

The chosen course of reforming primary education towards raising standards was continued by the publication of *'Primary Framework for Literacy and Mathematics'* in 2006. The document set the objectives to identify ways of ensuring the quality of education at ISCED 1, to guarantee the achievement of high standards of literacy and numeracy by all primary school students, to coordinate the content of teaching, and to promote continuity within the educational stages and between them.

Taking into account the results of scientific research over the 1990s and national policies in the field of school education, the updated 'Framework' offered teachers the descriptors of results for each phase as a tool for planning individualized language (speaking, listening, reading) and mathematics learning [10].

As the next step in improving the curriculum educationalists suggest a new 'core' in which it is recommended to include, in addition to the traditional English language (and literature) and mathematics, information and communication technology [5, p. 22].

The 2014 new National Curriculum differs from the previous version (1999) by the lack of 8-level assessment scale of students' achievements. In the 2014 National Curriculum performance standard is directly determined in study programs as something that 'students must know, use and understand'. The cancellation of levels was caused by the lack of specific information as to the achievement of a certain level, namely what a student can do, and recommendations for progress. On the other hand, the use of levels as targets had a negative impact on students who failed to achieve the target levels, causing a problem of 'labeling' the underachieving children.

To replace the levels reporting on students' productivity at the end of key stages British experts have worked out new performance descriptors for assessing students by teachers. Performance descriptors in the core subjects identify what pupils are able to do if they meet certain standards. For KS1 teachers assess students in mathematics, reading and writing as meeting one of four standards: mastery standard; national standard; working towards national standard; below national standard. The descriptor for each standard comprises a number of statements of what students should be able to do in each aspect of the subject, the total comprising 50 or so such elements. Using professional judgement and evidence from class work and a range of activities, teachers decide which standard most closely matches a student's overall attainment. Students must demonstrate a majority of the elements described for working at a standard. For science at KS1 and KS2 there is a single descriptor – 'working towards national standard' [12, p. 11].

Because of the preparation for a national test at the end of KS 2 and the new requirements of the Ministry of Education (85% of primary school students have to fulfill the standard in comparison with the previously 65%) educationalists point to the increase in learning load of younger students. Besides, the standard must be achieved in reading, writing and math, while earlier it involved any *one* or more of these three aspects.

## Results

The British experience in developing educational standards, their implementation and regular review characterizes the standard as a concept that is constantly changing under the influence of requirements for public education. The standard of the British primary education covers:

- the structure of primary education at key stages;
- the primary school curriculum;
- the structure of the content of primary education in its invariant and variant parts;
- the compulsory minimum content for each educational area included into the invariant part;
- the compulsory learning outcomes at each stage;
- the norms of academic load for primary school students to provide a quality training.

In Britain, as in other EU countries, standardization of primary education has caused an increase in educational requirements, improvement of assessment system, search of common criteria for the selection and implementation of curriculum content, textbooks, and manuals.

Political requirements to set high standards of students' educational achievements are supported by appealing to a higher level of education in such countries as Japan and Korea.

A positive aspect of the standard-based reforms was the fact that the standards allowed to correlate educational goals and objectives stated in the curricula with the available indicators of the productivity of students and school groups, to identify ways of improving classroom activities and teacher professionalism. However, the studies of comparativists state that the reforms have increased the load on the teachers: there have appeared new forms of work related to the practical implementation of standards and assessment of students' educational achievements.

Among the negative results of educational standardization at ISCED 1 teachers' most concern is the system of testing students' knowledge, which affected the quality of interaction between a teacher and students significantly reducing the number of educational technologies and techniques that are used by a primary school teacher.

### **Conclusions**

To sum up we should note that:

- the trend of content standardization on the level of basic education in the UK has become an active factor in the curriculum reform of primary education, modernization of its content and introduction of new disciplines;
- the British educational standards have become a practical implementation of new philosophical views on education which in the 21<sup>st</sup> century is developing under the slogan 'equal access to quality education';
- the standardization of primary education in the UK has allowed politicians and educators to solve the problem of continuity between preschool education and primary education and between primary education and secondary one;
- the framework of modernized curriculum of British primary school is favorable for widening school and teacher autonomy;
- the main approach of designing primary school curricula is around subjects or learning areas;
- the standard-based reforms in Britain at the turn of 20<sup>th</sup> – 21<sup>st</sup> centuries caused the narrowing of the primary curriculum (with the main focus on linguistic and mathematical literacy) and reorientation of the educational process to preparing younger students for specific assessment procedures (mostly testing);
- reforms to improve educational standards have found their practical implementation in the provision of professional development opportunities for teachers, creation of modern learning materials and organization of teachers' professional organizations;
- the unified state requirements for all schools allow to provide students with knowledge and skills set by educational standards, check the level of implementation of educational standards, and conduct national testing.

Thus, among the priorities of standardization of primary education is to find the appropriate principles of the organization and selection of content. Raising standards and development of assessment criteria of the national system are considered as important factors of social progress and the country's competitiveness in the context of globalization processes.

### **References:**

1. Council of Europe. Resolution 1 on the European Dimension of Education : Teaching and Curriculum Content. Strasbourg : Council of Europe, 1991. 11 p.
2. Zagvozdkin, V. K. Retsenziya na knigu "O razrabotke natsionalnyih standartov obrazovaniya. Ekspertiza" / V. K. Zagvozdkin // Voprosy obrazovaniya. 2008. № 4. S. 282-293.
3. Standaert, R. Inspectorates of Education in Europe: A Critical Analysis / R. Standaert. ACCO, 2001. 122 p.
4. Zagvozdkin, V. K. Teoriya i praktika primeneniya standartov v obrazovanii. M. : Narodnoe obrazovanie : NII shkolnyih tehnologiy, 2011. 344 s.
5. Independent Review of the Primary Curriculum: Final Report. Nottingham: Crown, 2009. 209 p.

6. EURYDICE (Network on Education Systems and Policies in Europe). Structures of Education and Training Systems in Europe. United Kingdom – England. 2009/10 / Prepared by C. Higginson. Brussels : European Commission, 2010. 55 p.
7. White Paper : Excellence In Schools. London : Her Majesty's Stationery Office, 1997. 83 p.
8. Tymms, P. Standards and Quality in English Primary Schools over Time: The National Evidence. Research Survey 4/1 / P. Tymms, C. Merrell. Cambridge: University of Cambridge, 2007. 32 p.
9. INCA.Thematic Probe. Primary Education: an International Perspective. England. London: INCA, QCA, NFER, 2003. 18 p.
10. DfES (Department for Education and Skills). Primary Framework for Literacy and Mathematics. Primary National Strategy. Norwich: The Stationery Office, 2006. 136 p.
11. The national curriculum in England. Framework document. July 2013. London: DfE, 2013. 224 p.
12. Harlen, W. Assessment Standards and Quality of Learning in Primary Education / W. Harlen. York: Cambridge Primary Review Trust, 2014. 40 p.