AEO «NAZARBAYEV INTELLECTUAL SCHOOLS»

EXTERNAL SUMMATIVE ASSESSMENT AS A FUNCTIONAL LITERACY MEASUREMENT TOOL

Astana, 2016

LITERATURE REVIEW

- Only 30% of school graduates have reading literacy skills and are ready to study at colleges (Greene & Forster, 2003).
- Less than 50% of college graduates who take American College Testing meet the college requirements on reading literacy (ACT, 2006).
- 35 - 40% of school graduates do not acquire academic reading skills which match employers` requirements (Achieve, Inc., 2005; Kaestle et al., 2001; National Commission on Writing, 2004).
- More than 75% of college graduates taught in two year programmes and 50% of college graduates taught in four year programme demonstrate low literacy level. They have difficulties in summarizing newspaper articles, apply mathematical techniques. It means that students graduating college only acquire basic skills ("The National Survey of America's College Students," 2006).
- There is no difference between literacy level among male and female college graduates ("The National Survey of America's College Students," 2006).

Assessment tools for assessing learners are developed by Cambridge International Examinations which are comparable with Cambridge International AS and A-level.

School graduates sat exams on following subjects :

<table>
<tr><td rowspan="2">Mathematics

Kazakh/
Russian</td><td rowspan="2">Kazakhstan in the Modern World

Kazakh</td><td>Physics</td><td>Chemistry</td><td>Biology</td><td rowspan="2">Geography

Kazakh</td><td rowspan="2">Computer Science

English/
Russian</td></tr>
<tr><td colspan="3">Kazakh/English/Russian</td></tr>
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compulsory **optional, 2 subjects are chosen**

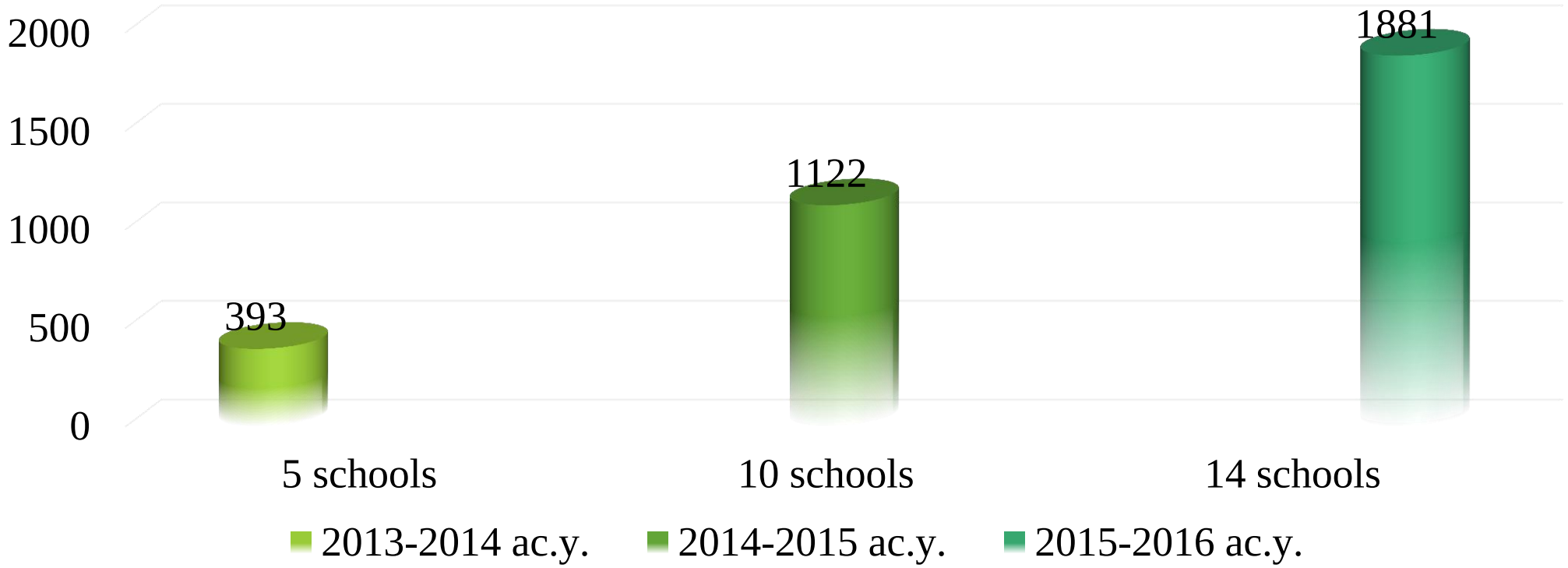
All students take IELTS

EXTERNAL SUMMATIVE ASSESSMENT ALLOWS ASSESSING

Mathematical literacy	Reading literacy	Information literacy	Numeracy literacy
Intercultural literacy	FUNCTIONAL LITERACY		Science literacy
Global literacy			Multiple literacy
Library literacy	Multilingual literacy	Environmental literacy	Media literacy

Literacy in the Information Age (2000)
Literacy Skills for the Knowledge Society (1997)
Education for All Global Monitoring Report (2006)

ENTRY NUMBER BY YEARS



Significant learners` progress on STEM subjects are seen

RESULT ANALYSIS OF EXTERNAL SUMMATIVE ASSESSMENT

Question number	Domain	Subdomain	Theme	Question description	Maximum marks	Average marks at NIS	1	2	2	3	4	5	6	7	8	9	10	11	12	13	14
8cii	Chemistry around us		Carboxylic acid	Draw optical isomers of a given acid	2	0,5	23,5	16,0	16,5	33,5	38,0	29,0	21,5	27,0	16,0	25,0	14,5	32,0	12,5	31,0	18,0
9a	Chemistry and life	Biochemistry	Carbohydrate	Write the equation of a carbohydrate hydrolysis reaction	1	0,6	47,0	45,0	56,0	76,0	62,0	70,0	70,0	69,0	58,0	69,0	50,0	68,0	67,0	68,0	64,0
9b	Chemistry and life	Biochemistry	Enzymes	Give a definition to the term enzyme peculiarity	1	0,4	37,0	36,0	61,0	38,0	54,0	10,0	43,0	41,0	49,0	31,0	42,0	32,0	17,0	34,0	64,0
9c	Chemistry and life	Biochemistry	Enzymes	Explain the process of enzymatic induction	3	0,8	15,7	28,7	26,0	14,3	66,7	19,3	24,7	24,7	19,7	34,0	29,3	21,3	16,7	24,7	36,3
9d	Chemistry and life	Biochemistry	Enzymes	Explain the process of competitive inhibition	3	1,0	24,3	25,7	39,0	20,7	51,3	20,0	30,3	54,3	27,7	41,3	19,3	32,0	16,7	60,3	41,3
9e	Chemistry and life	Biochemistry	Enzymes	Indicate why in high temperature enzyme lose its enzymatic activity	2	0,6	21,5	34,0	39,0	9,5	55,0	11,5	37,0	19,5	30,5	27,5	33,5	9,0	12,5	34,0	45,5
1a	Power in chemistry	Acid base theory	Titration	Draw a table and state the weight of the capacity with the substance, the empty tankage and weight of substance.	2	1,2	51,5	61,5	47,0	31,0	52,0	72,5	50,0	65,5	31,5	72,5	69,0	75,0	54,0	75,5	65,0

Indications	Grades
	Indicates the performance percent which corresponds to the grades A, B, C
	Indicates the performance percent which corresponds to the grades D and E
	Indicates the performance percent which corresponds to the grades U (ungraded, should warn about the problems in acquiring subject programme)

ANALYSIS OF LEARNERS` WORKS

Learners were good at the following themes:
«Average value», «Exponential increase and decrease», «Vector module», «Differential equation of second order describing harmonic motion», «Normal distribution», «Rational equations and inequalities», «Poisson distribution».

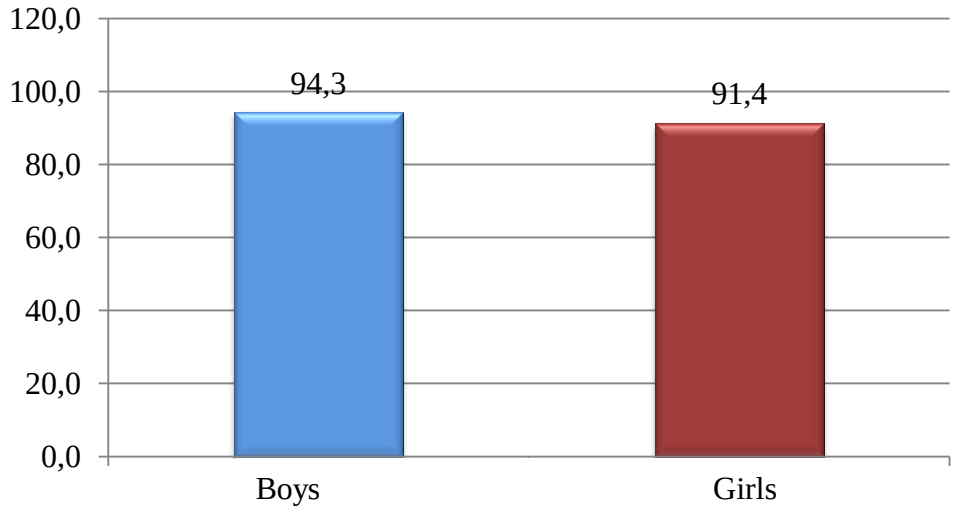
The experiment showed that at t hours the number of bacteria were equal to N. It is known that N = 50 000 where t = 0.

$$\frac{dN}{dt} = -0{,}3N$$

(a) Show that N = 50 000 e– 0,3t.
(b) Find the number of bacteria where t = 4, e = 2,718.
(c) Draw the sketch of a graph of dependency N from t.

Students` result analysis showed that students were able to integrate knowledge on theme "Exponential increase and decrease" in the context of biology. Students were able to find the number of bacteria at one point of time and draw the sketch of exponential function graph which describes biological process.

Learners` average marks on «Mathematics» in gender context



ANALYSIS OF LEARNERS` WORKS

1. Read the text below and use it and your knowledge to answer sub-questions **(a)**, **(b)** and **(c)**.

Kazakhstan`s cultural goals

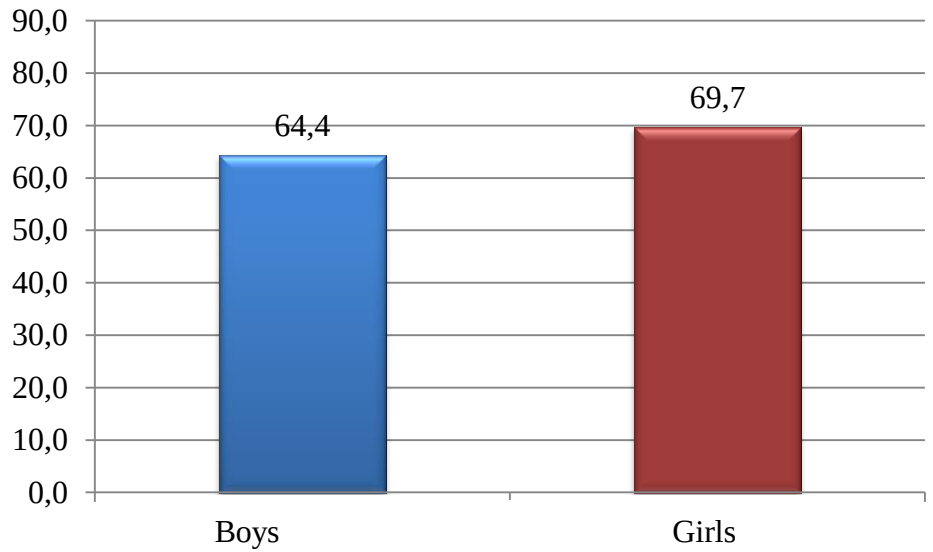
President Nursultan Nazarbayev in his address to the people of Kazakhstan, «Kazakhstan`s Way 2050: common goal, comon interests, common future», set a clear goal, "to develop a long term concept of the development of the cultural policy of the country, aimed at the formation of a competitive cultural mentality of Kazakh people and development of modern cultural clusters". The leader of the nation has put forward the fundamental idea of consolidation of our multinational state "Mangilik Yel" which has become a basic component of the draft concept of cultural policy. (Adapted from a newspaper report written by the Minister for Culture and Sport, 2014)

(a) Describe what is meant by "Mangilik Yel". (Line 8)
(b) Explain why "a qualitatively-new cultural product" is needed in Kazakhstan. (Line 19)
(c) "The cultural development of Kazakhstan should be based on its historical heritage". How far do you agree with this statement?

Learners used various facts and evidence in corresponding context, expressed own viewpoints consistently and systematically. For example, tasks on values «Mangilik Yel» showed good knowledge of values and history, deep understanding of question content.

Learners showed good research skills in themes as "Kazakhstan and globalization" and were good at writing course works on KiMW.

Learners` average marks on «Kazakhstan in the Modern World» in gender context



ANALYSIS OF LEARNERS` WORKS

Physics

Students showed reading literacy and skill of graph interpretation on theme «Thermodynamics».

Fig. 3.1 **shows** a piston trapping a fixed mass of an ideal gas in a cylinder at a temperature of 285 K.

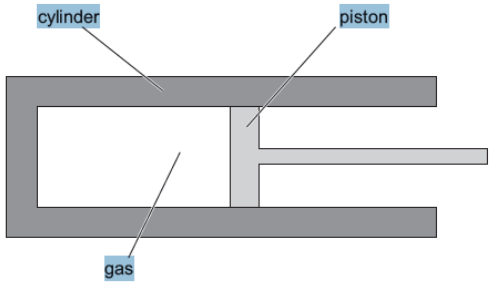


Fig. 3.1

The pressure and volume of the gas are represented by point A on the pressure-volume graph in Fig. 3.2.

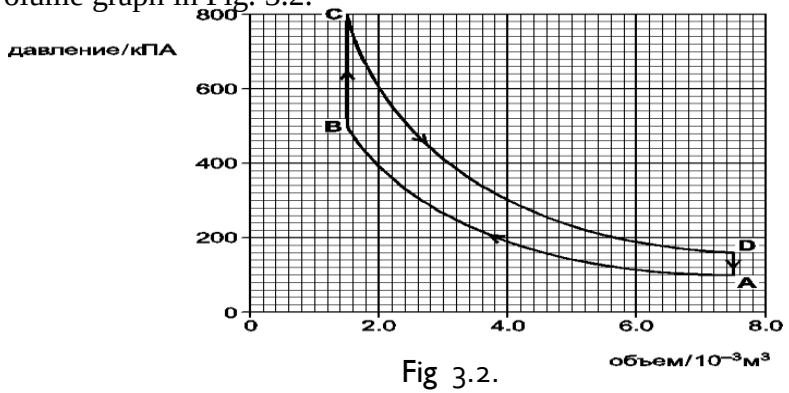


Fig 3.2.

The gas repeatedly undergoes a series of four isoprocesses as shown on Fig. 3.2.

- During stage AB, the gas is compressed at constant temperature.
- During stage BC the gas is heated at constant volume.
- During stage CD the gas expands at constant temperature.
- During stage DA the gas cools at constant volume.

(a) State the name of the isoprocess occuring during stage AB.

(b) At point B the gas is at temperature of 285 K.

(i) Using point B in Fig. 3.2, determine the number of moles of gas in cylinder.

(ii) Using Fig. 3.2, determine the temperature of the gas at point D.

(c) The cylinder has a uniform cross-sectional area.

(i) State and explain how the average force exerted by the gas on the piston during stage CD compares with the average force exerted during stage AB.

(ii) State the stage during which:

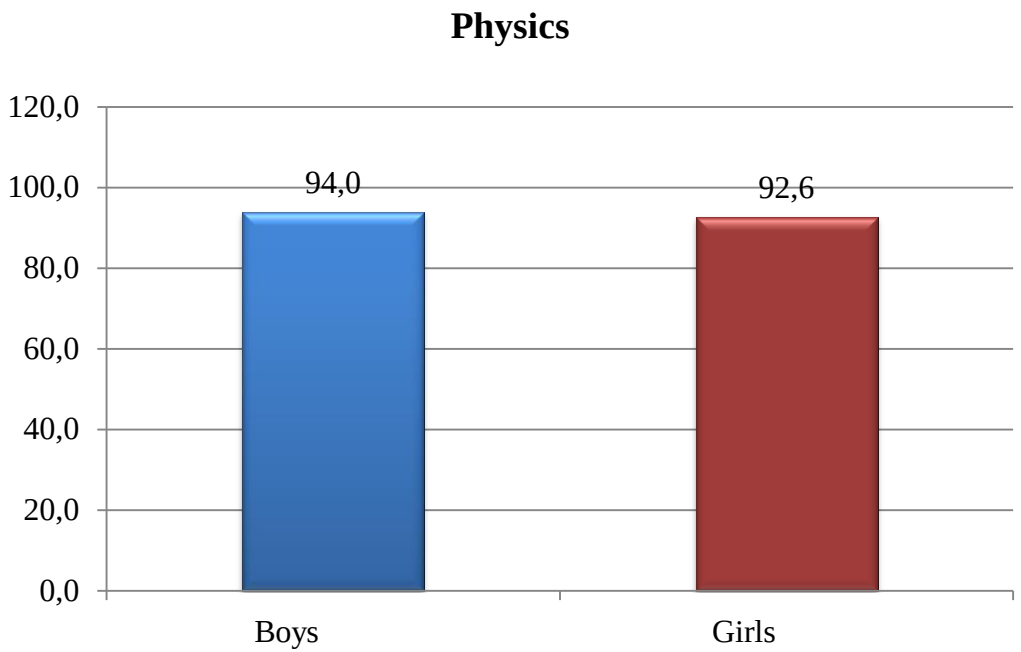
work is done on the gas,

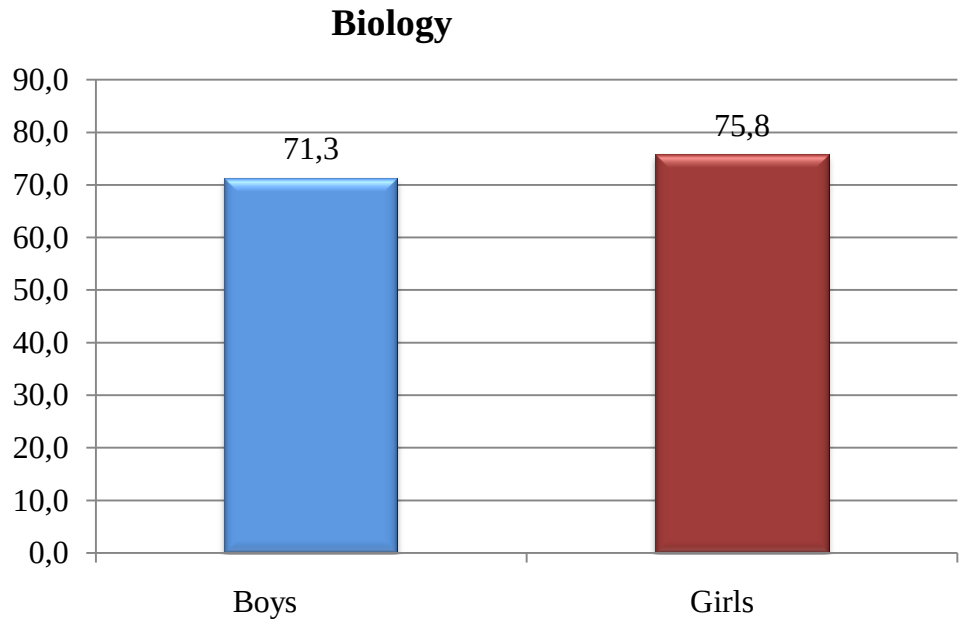
work is done by the gas.

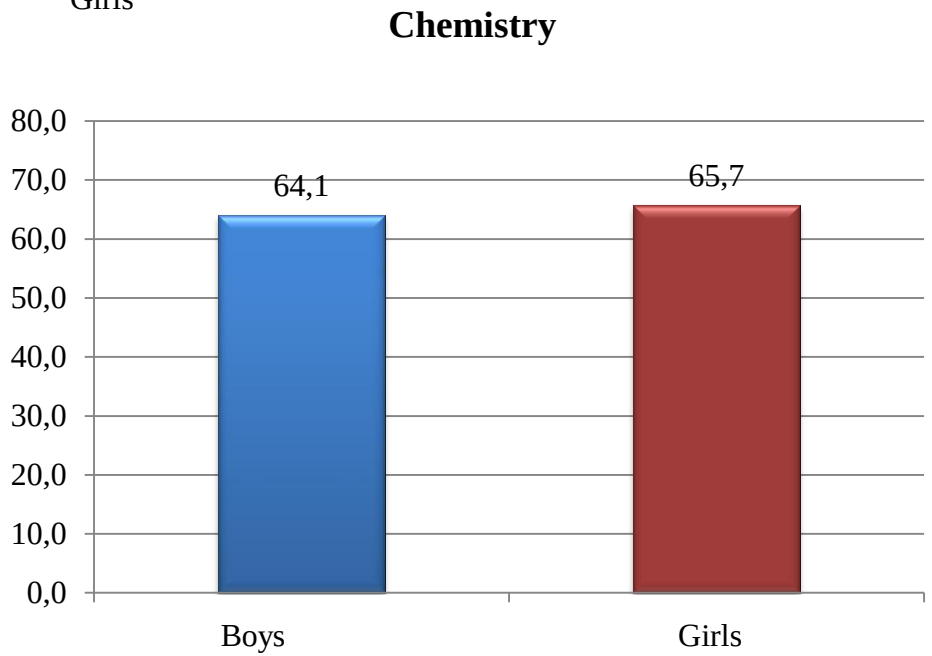
(iii) During a complete cycle ABCDA more work is done by the gas than is done on the gas. Explain why.

(d) As the gas repeats the cycle ABCDA, useful work can be done by the piston. State the name of the device that operates on this principle.

LEARNERS` AVERAGE MARKS ON SUBJECTS «PHYSICS», «CHEMISTRY», «BIOLOGY» IN GENDER CONTEXT







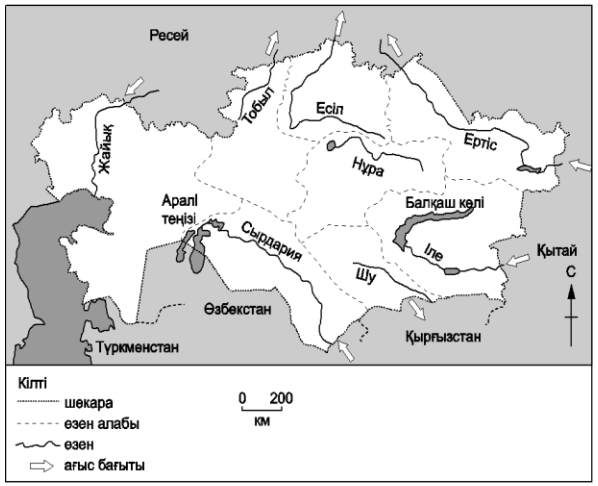
ANALYSIS OF LEARNERS` WORKS

Geography

Students mostly chose the themes «Tourism» and «Water resources» and showed good results on these topics.

Water resources

1. Figure 6 shows the main river basins of Kazakhstan and Figure 7 gives information about them.

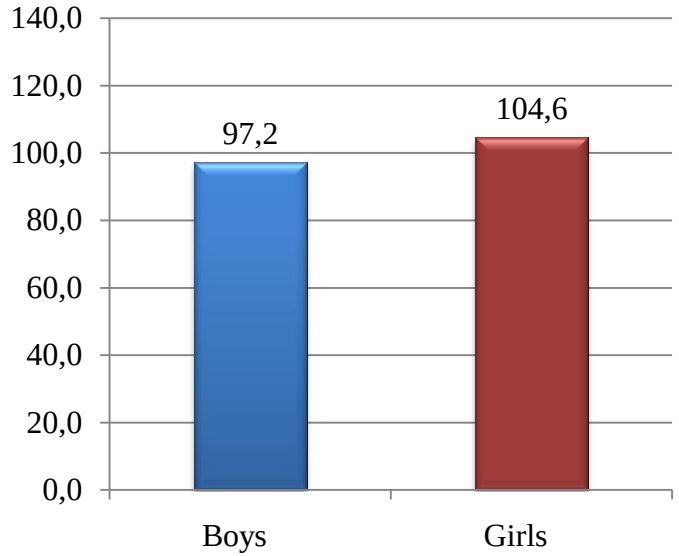


6-сурет

River basin	River discharge (km³/year) Total	Flow from inside Kazakhstan	Flow from other countries	Minimum flow in dry years
Syrdarya	13.3	3.3	10.0	4.2
Ile	28.8	16.4	12.4	17.8
Chu	3.2	1.2	2.0	2.7
Yertys	34.0	24.5	9.5	19.7
Nura	1.7	1.7	-	0.1
Yesil	2.6	2.6	-	0.3
Tobyl	2.1	1.5	0.6	0.3
Zhaiyk	13.9	5.3	8.6	3.0

7-сурет

Average marks of studentson «Geography» in gender context



(a) What is meant by each of the following terms as used in Figure 6 and Figure 7?
(i) River basin
(ii) Watershed
(iii) Discharge
(b) Identify one factor which affects the discharge of a river.
(c) (i) Identify two rivers shown in Figure 6 which have their sources outside Kazakhstan and their mouths within Kazakhstan .
(ii) Identify one river shown in Figure 6 which is entirely within Kazakhstan.
(iii) Kazakhstan has international agreements with other countries about the use of water from rivers. Name one country with which use of the Syrdarya river has been agreed.
(iv) Which river shown in Figure 6 and 7 has the most reliable supply of water?
(d) Look at the Zhaiyk, Nura and Ile rivers. Using Figures 6 and 7, discuss the advantages and disadvantages of using these rivers for supplying water resources.
(e) Suggest the effects on Kazakhstan if China increased its use of water from the Yertys river.

ANALYSIS OF LEARNERS` WORKS

In a coursework learners create a system for a real client

Learners` database for educational organizations

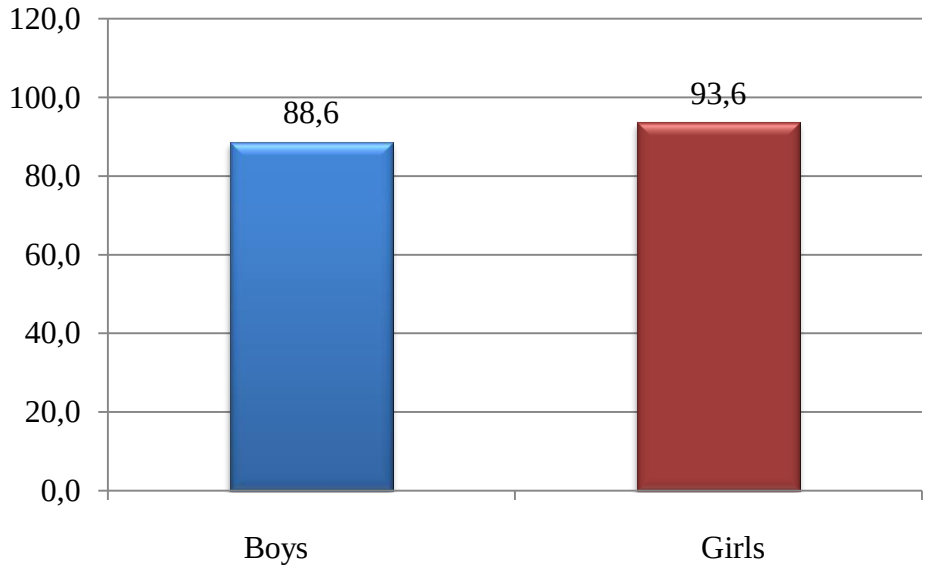
Android applications for mobile phones

Robot programmin g

3D modelling of architectural projects

ARDUINO programming which are used for smart houses and mobile apps

Learners` average mark on «Computer Science» in gender context



CONTEXT ANALYSIS OF STUDENTS` RESULTS

Duration of study in Intellectual schools and average marks on subjects

Subjects / Entrance grade	Biology	Chemistry	Computer Science	Geography	KiMW	Mathematics	Physics
4	71,5	62,73	101,4	106,55	69,77	94,77	94,79
5	66,37	61,61	96,12	86,33	65,83	101,11	88,98
6	83,53	59,96	99,57	102,24	68,55	78,36	94,74
7	82,12	71,6	98,45	99,24	68,87	99,68	94,47
8	72,84	60,18	88,41	103,95	68,32	98,34	96,06
9	74,73	69,98	86,38	105,08	68,33	84,17	90,18
10	-	-	99,67	97	77,67	72	86,67
11	59,5	41,67	88	104,6	72,33	86,67	97,2

Social awareness and critical enquiry are key factors in social change (Paulo Freire, 1970)

Duration of kindergarten attendance and average marks on subjects

Subjects / Number of years in kindergarten	Biology	Chemistry	Computer Science	Geography	KiMW	Mathematics	Physics
not attended	76,43	65,67	86,6	103,4	69,55	90,93	90,08
1	71,99	64,39	92,38	102,6	67,73	92,47	93,18
2	75,99	66,34	96,02	101,74	68,07	95,14	96,35
3	72,66	65,07	91,14	101,09	67,27	93,37	94,5
4 or more	74,27	64,54	94,35	101,85	68,02	94,69	95,73

CONCLUSION

Intellectual schools graduates were able to perform tasks which required :

- extended answers
- practical experiments
- knowledge of international standards of writing numbers
- ability on integrating knowledge and skills from various subject areas
- coursework writing

Some Intellectual school graduates found difficult to solve tasks which required:

- rounding numbers (due to inattentive reading of task condition).
- skills of reading legends (straightly switch to the questions ignoring given information which result in incorrect answer).
- Knowledge of all steps in command cycle and using twos знания всех шагов выполнения цикла команд, использования двумерного массива и навыков программирования.

Thank you for your attention!!!