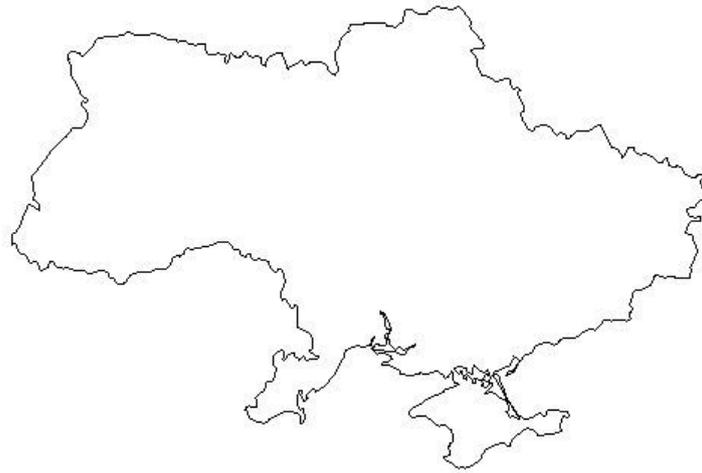


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Submitted by:

American Institutes for Research

With:

American Councils for International  
Education

U.S. Agency for International Development

Contract No. EDH-I-00-05-00027-01

## **Pilot Predictive Validity Study of the External Independent Assessment of the 2008 University Applicants According to the Results of the Winter and Summer Terms of the 2008-2009 Academic Year**

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### **Quality criteria of the Higher Educational Institution (HEI) admission system on the basis of the External Independent Assessment (EIA) results**

Two thousand eight was the first year that EIA exams of educational achievement were conducted nationwide. It was also the first time admission to HEIs was based on the EIA results. The next step in EIA development was made in 2009: the list of testing subjects was changed, economics and civics tests were dropped, foreign languages tests were added, and HEI admission requirements were modified to conform to equal access to higher education principles.

Simultaneously, considerable efforts were made in order to improve test materials quality, which included:<sup>1</sup>

- Creation of a national item bank of standardized test items;
- Item writers were trained by international experts;
- A National Contest of Test Item Writers was carried out.

*Basics of Educational Assessment and Education Quality Monitoring* course was introduced in 25 universities of Ukraine. The working group created by the Ministry of Education and Science (MOES) is developing a state standard for the training of Masters in Testology and Educational Assessment.

The EU TEMPUS project *Educational Measurement Adapted to EU Standards* started on January 15, 2009 in the following universities: Nizhyn State Mykola Gogol University, National Pedagogical Dragomanov University, Kirovograd State Pedagogical University named after Volodymyr Vinnichenko, Mälardalen University, Helsinki University of Technology, University of Roma "La Sapienza," The University of Cologne and Ministry of Education and Sciences of Ukraine. The major objective of the project is to develop and advance the curricula for the Educational Measurement specialization, including the topic in such pedagogical fields as Mathematics, Physics and Informatics. New courses will be based on the use of modern methods, instruments, theories and systems for describing, interpreting and understanding knowledge, skills and attitudes of individuals and groups.

Numerous public opinion surveys prove that trust to EIA as an admission tool is rather high and is continuously growing.

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<sup>1</sup> With *USETI* assistance

The mass media has constantly voiced criticism of the EIA system, suggesting various faults of the system, which can destroy all the positive achievements that have been made. The development of the EIA system has also been a topic of ongoing political speculations, making it a hostage of subjective judgment, but a weak civil society has been unable to resist political expediency.

Under such conditions, finding objective indicators that would prove EIA results to be effective as a HEI admission tool has become extremely important. Moreover, such indicators of effectiveness and quality are necessary for the EIA system and society, and should serve as feedback for the EIA system and HEIs, providing objective characteristics of its current condition and thus creating grounds for its stable operation and development.

There is a range of objective indicators of effectiveness and quality of the HEI admission system that can be expressed as numerical values:

- 1. Effectiveness of the HEI admission system** (predictive validity of the admission criteria).  
*Indicator:* correlation coefficient of the admission criteria with the HEI students' performance in the first two terms.  
*Mechanism:* monitoring correlation of the HEI students' performance with the EIA results and other HEI admission criteria (in particular High School GPA (HSGPA)).
- 2. Fairness of the HEI admission system.**  
*Indicator:* percent of those who entered HEIs from the general number of those who sought admission.  
*Mechanism:* monitoring fairness indicators of the admission system on the basis of the EIA participants' registration database and admission results.
- 3. Relevance of the HEI admission system to the demands of the society.**  
*Indicator:* percent of those perceiving the admission system and its components positively.  
*Mechanism:* monitoring relevance of the admission system to the demands of the society by way of surveying various social categories: stakeholders and customers of educational services (HEI applicants, educators, employers, etc.).

The International Renaissance Foundation is currently supporting the Center of Testing Technologies (CTT) to carry out the *Study of the quality of the HEI admission system on the basis of EIA*. The study will analyze the above indicators across a representative sample from HEIs, HEI students, HEI faculty, high school students, and teachers. This project is to be carried out from October 1, 2009 till March 31, 2010 on the basis of EIA-2008 results and first year students' results in the 2008-2009 academic year.

The predictive validity study of the EIA-2008 tests will be discussed further in this report. The current study should be considered a pilot, because its purpose is to show the methodology that should be used to measure the predictive validity of EIA test results as HEI admission criteria. That is why the findings in this study should be treated with caution because HEI and student samples were not extensive enough. Also, not all HEIs provided the winter term students' results and very few HEIs were able to provide High School GPA.

The study was conducted by an NGO *Center of Educational Policy* with *USETI* assistance.

Throughout the world, studies of the quality of HEI admission criteria are usually done by the companies administering the tests. However, these companies cooperate with the organizations interested in HEI admission system efficiency (university associations, schools, employers, students, parents, etc.).<sup>2</sup>

In Ukraine, the predictive validity study of the EIA tests carries special meaning because at this time the society is transforming its perception about intellectual resources as the most valuable resources in the country. In Ukraine such studies, especially studies of predictive validity of EIA tests, have not been conducted systematically but rather as pilot initiative studies by a number of HEIs.

### **Predictive validity of the HEI admission criterion and its categories**

It is natural to expect that an effective criterion for student HEI admission would positively correlate with the HEI student performance. In Ukraine one of the HEI admission criteria is a sum of EIA certificates scores.

An HEI educational achievement indicator is a more complex category including the following: how successfully a certain specialization is mastered and/or how successfully a specialist is employed. However, since these indicators are very difficult to measure, the chosen indicator of the success in HEI is students' first year performance; in particular success in passing first and second term exams. The indicator itself is an average of the first and second term GPA.

Thus, it is relevant to consider the predictive validity of EIA test scores as a criterion for students' first year GPA (FYGPA). It would be interesting to study finer correlations of different EIA subject scores with subjects and/or groups of subjects: general, basic, specialized, elective. However, the major indicator is the correlation of EIA tests GPA with the students' FY GPA.

### **What predictive validity level should be considered as inappropriate, low, medium and high?**

*Predictive validity of the HEI admission criterion* is a correlation coefficient of this criterion (e.g. test score or HSGPA) with the students' first year GPA.

Predictive validity can range from -1.0 to 1.0 and correlation coefficients can be interpreted as follows:

- a *large* correlation has an absolute value of approximately 0.5 or higher;
- a *medium* correlation has an absolute value of approximately 0.3;
- a *small* correlation has an absolute value of approximately 0.1;

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<sup>2</sup> For example such studies in the USA are conducted by the College Board, a representative body for more than 5000 colleges and universities, government and non-government organizations. HEIs (over 800) take part in predictive validity studies on a voluntary basis.

- an *inappropriate* correlation is negative correlation (in this case it is impossible to use the criterion for predictive validity in general, as well as for HEI admission in particular).

*Cohen, J. (1988). Statistical power analysis for the behavioral sciences*  
(2d ed.). Hillsdale, NJ: Lawrence Erlbaum Associates.

As an example below you will find a table presenting SAT predictive validity. SAT is one of the most widely used university admission tests in the USA. The table also shows predictive validity of the HSGPA, and SAT and HSGPA combined.

**Table1. Correlations of SAT and HSGPA with FYGPA by Institution Control, Selectivity, and Size**

		<i>N</i>	<i>SAT-CR, SAT-M, SAT-W</i>	<i>HSGPA</i>	<i>SAT+HSGPA</i>
Control	Private	45786	0,39	0,37	0,48
	Public	105 530	0,34	0,36	0,45
Selectivity	Under 50%	27 272	0,39	0,36	0,47
	50-75%	84 433	0,34	0,35	0,44
	Over 75 %	39 611	0,36	0,40	0,47
Size	Small	6 471	0,42	0,41	0,52
	Medium to large	30 333	0,36	0,38	0,47
	Large	40 861	0,34	0,37	0,45
	Very large	73 651	0,36	0,35	0,45

Research Report No. 2008-5 Validity of the SAT for predicting First-year College Grade Point Average

Publishing such statistics allows for discussion about the HEI admission policy effectiveness on a constructive level. The ubiquity of such publications is the evidence of the amount of attention and interest of the society in the effectiveness and fairness of the HEI admission system (This data was published in *The New York Times* - one of the most popular and competent newspapers in the USA).

### **Findings of the Pilot Predictive Validity Study of the EIA tests**

This research studied the correlation of the first year students' GPA during the 2008-2009 academic year with the EIA scores and High School GPA (HSGPA). First year students' performance data of the following HEIs were used to conduct the study:

**Table 2. HEIs – participants of the Pilot Predictive Validity Study of the External Independent Assessment (EIA)**

No	Educational Institution <sup>3</sup>	Number of participants	Percent (of total number)	Cumulative percent
1.	National Pirogov Memorial Medical University, Vinnytsya	696	7,6	7,6
2.	Donetsk National University of Economics and Trade after M. Tugan-Baranovskyy	643	7,0	14,6
3.	Southern Branch “Crimean Agrotechnological University” of the National Agricultural University	563	6,1	20,7
4.	Ivan Franko Lviv National University*	3229	35,1	55,8
5.	Higher educational institution “National Academy of Management”	147	1,6	57,4
6.	Taras Shevchenko Kyiv National University	1537	16,7	74,1
7.	South Ukrainian State K.D. Ushynsky Pedagogical University	249	2,7	76,8
8.	National University “Ostroh Academy”**	412	4,5	81,3
9.	V.N. Karazin Kharkiv National University	887	9,6	90,9
10.	Kharkiv National University “Kharkiv Polytechnic Institute”	838	9,1	100,0
	<b>Total</b>	<b>9201</b>	<b>100,0</b>	<b>100</b>

Table 2 shows the major types of HEIs and all the regions of Ukraine were represented. Performance data of 9200 first year students of the 2008-2009 academic year were used. Correlation coefficient significance level of the results used in the study is not lower than 0.02. Correlation with HSGPA was calculated only for those HEIs which could provide the HS certificate data.

Pearson correlation of EIA results and FYGPA is 0,503 (based on the results of 3657 students). To compare: correlation of EIA results with HSGPA is 0,399 (based on the results of 508 students).

Thus, according to the international classification predictive validity of EIA tests as the HEI admission criterion is **high**.

The table below shows a more detailed data of the study.

<sup>3</sup> The study was based on the students' performance data of the winter and summer terms. The HEIs marked with asterisks provided only summer term results.

**Table 3. Predictive validity of various indicators**

Indicators		HSGPA	HS Exams GPA	EIA Scores	Winter Term GPA	Summer Term GPA	FY GPA	EIA scores and HS GPA
<b>HS GPA</b>	Correlation	1	,631(**)	,513(**)	,377(**)	,382(**)	,399(**)	,751(**)
	N	508	147	508	508	505	508	508
<b>HS Exams GPA</b>	Correlation	,631(**)	1	,458(**)	,592(**)	,474(**)	,559(**)	,636(**)
	N	147	147	147	147	147	147	147
<b>EIA GPA</b>	Correlation	,513(**)	,458(**)	1	,483(**)	,484(**)	,503(**)	,847(**)
	N	508	147	9200	4300	8554	3657	508
<b>Winter Term GPA</b>	Correlation	,377(**)	,592(**)	,483(**)	1	,760(**)	,930(**)	,499(**)
	N	508	147	4300	4301	3655	3658	508
<b>Summer Term GPA</b>	Correlation	,382(**)	,474(**)	,484(**)	,760(**)	1	,946(**)	,496(**)
	N	505	147	8554	3655	8555	3655	505
<b>FY GPA</b>	Correlation	,399(**)	,559(**)	,503(**)	,930(**)	,946(**)	1	,524(**)
	N	508	147	3657	3658	3655	3658	508
<b>EIA and HS GPA</b>	Correlation	,751(**)	,636(**)	,847(**)	,499(**)	,496(**)	,524(**)	1
	N	508	147	508	508	505	508	508

As the above table shows correlation coefficients with winter term and summer term results is somewhat lower: 0.483 for the winter term (4300 students) and 0.484 (8554 students) for the summer term.

More thorough analysis of the received data shows:

- Correlation coefficient of FYGPA with the EIA scores in Ukrainian Language and Literature is almost as high as the general correlation and is 0.497 (based on the 9173 students' results).
- Correlation coefficient of FYGPA with the EIA scores in Mathematics is 0.412 (3465 students).
- Correlation of FYGPA with the EIA scores in the History of Ukraine is 0.573 (1745 students).

Table 4 shows the results according to each HEI.

**Table 4. Correlation coefficients of various students' characteristics with FYGPA according to HEIs.**

Higher Educational Institution	Correlation of EIAGPA with FYGPA	Correlation of EIAGPA with winter term GPA	Correlation of EIAGPA with summer term GPA	Correlation of HSGPA with FY GPA	Correlation of the sum of EIA GPA and HS GPA with FYGPA	Total number of students
Taras Shevchenko Kyiv National University	0,505	0,479	0,459	0,466 (only for those majoring in Mathematics and Information Technologies)	0,716 (only for those majoring in Mathematics and Information Technologies)	1536
V.N. Karazin Kharkiv National University	0,464	0,428	0,457	0,411 (186 students)	0,526 (186 students)	922
Kharkiv National University "Kharkiv Polytechnic Institute"	0,496	0,496	0,461			857
Donetsk National University of Economics and Trade after M. Tugan-Baranovskyy		0,548				643
South Ukrainian State K.D. Ushynsky Pedagogical University	0,479	0,440	0,457	-	-	243
Higher educational institution "National Academy of Management"	0,548	0,572	0,479	0,716	0,740	147
Southern Branch "Crimean Agrotehnological University" of the National Agricultural University	-	-	0,362	-	-	563
National Pirogov Memorial Medical University,	-	-	0,645	-	-	696

<b>Vinnytsya</b>						
<b>National University “Ostroh Academy”*</b>			0,632			412
<b>Ivan Franko Lviv National University*</b>	0,612					3229

According to the data shown in the table above, HSGPA is a worse predictor of student performance than EIA scores (not including the private educational institution “National Academy of Management”). However, using HSGPA along with the EIA scores strengthens the correlation.

Correlation of the summer and winter terms students’ performance with EIA scores in separate tests and in some cases with the entrance exams conducted by some HEIs (for certain student categories) was also studied. These findings show high correlation of EIA results in Ukrainian Language and Literature irrespective of the field of study. The correlation of FYGPA with Ukrainian Language and Literature EIA scores is higher than with other EIA test scores. Only for those majoring in Mathematics, Physics and Engineering FYGPA correlates better with EIA in Mathematics than Ukrainian Language and Literature.

Students of the Mechanics and Mathematics Faculty of Taras Shevchenko Kyiv National University: correlation coefficient of FYGPA with the Ukrainian Language and Literature EIA results is 0.337 and with Mathematics EIA results is 0.635. It should also be noted that for these students correlation of their Ukrainian Language and Literature EIA results with Mathematics EIA results is only 0.249.

The preliminary analysis shows that the Ukrainian Language and Literature EIA test is not a significant predictor of students’ ability to study completely new academic courses in Philology. For example, according to the Lviv National University data the correlation of the Ukrainian Language and Literature EIA test with students’ performance in Latin and Slavic languages is only 0.21-0.25.

More thorough analysis of the findings might be useful for improving student admission procedures and EIA system, as well as higher education system professionals’ training.

### **Outcomes**

1. This pilot study proves that HEI admission system based on EIA tests is highly effective. However the findings of this study need to be additionally verified on the basis of more extensive and representative samples of HEIs, fields of study and students.
2. Studies of predictive validity of EIA tests as a HEI admission tool should be continued on the statistically significant samples of HEIs, fields of study and students – *this will provide objective data for improving HEI admission system and EIA tests.*
3. Studies of predictive validity of EIA tests should be conducted alongside of the studies of other indicators of the HEI admission system on the basis of EIA tests – *Fairness of the*

*HEI admission system and Relevance of the HEI admission system to the demands of the society.* Altogether they should provide objective evidence of how equal is the access to quality higher education.

4. Studies of predictive validity of EIA tests should be conducted on a regular basis (this pilot study is conducted on the basis of EIA-2008) – this will provide feedback for the *EIA-HEI admission-HEI students' performance* system thus creating prerequisites for improving all the elements of this system.
5. Studies of predictive validity of EIA tests are quite laborious and demand coordinated cooperation of various institutions: MOES, HEIs, UCEQA and Academy of Pedagogical Sciences which entails the development of the integrated program *Effectiveness of the HEI Admission System* (the study presented above was conducted with the organizational and financial support of *USETI*).