

THE LEONARDO PROJECT

Andrea Kárpáti

Paper presented at „Advancing Learning Communities In The New Millennium”, the 8th European Conference of EARLI, the European Association for Research on Learning and Instruction, August 24-28, 1999 - Göteborg, Sweden

Abstract:

Art educators have always been intrigued by findings of psychologists proving that *there are no or just insignificant correlations between the developmental level of mental skills and visual skills and abilities*. In the course of the *Leonardo Program*, a curriculum design and assessment program coordinated by the Hungarian Academy of Crafts and Design to assess the developmental potentials of five different curricula developed by teams consisting of two art teachers, an art historian, an artist or designer and an educational researcher.

These experimental curricula represented an effort to harmonize requirements, ideals and experiences of all fields related to arts education. They were developed for *6 - 14 - year - olds*, (8 grades of the compulsory primary school) and tested for 3 school years. We utilized a set of *9 mental abilities tests* to measure five areas of mental development: 1. general learning abilities and intelligence, 2. attention span, 3. visual memory, 4. perception of space and 5. creativity.

7 art education tasks were used to assess how *five different approaches to visual art education*: 1) emphasis on environmental culture / design, 2) color use and perception, 3) photography and video, 4) integrated arts program / aesthetic education and 5) focus on art criticism and art history affect different areas of mental development.

This paper introduces the psychological tests used in the Leonardo Project and shows examples of tests and tasks used and explains relationships of mental and visual skills and abilities. While no connections were found with intelligence and creativity, the new art education programs successfully developed *visual memory and spatial abilities* of students.

Five alternative curricula and skills, abilities and attitudes developed by them

CURRICULUM FOCUS	KNOWLEDGE	SKILLS AND ABILITIES	ATTITUDES
-----------------------------	------------------	---------------------------------	------------------

<p>1) DESIGN</p>	<ul style="list-style-type: none"> - history of crafts, design and architecture, - environmental aesthetics, - cultural history 	<ul style="list-style-type: none"> - verbal and visual methods of art analysis: form/function, color composition, iconography - planning - modelling - folk crafts - craft and design techniques 	<ul style="list-style-type: none"> - protection of the natural and man-made environment - preservation of cultural heritage - efforts to shape own environment aesthetically
<p>2) COLOR</p>	<ul style="list-style-type: none"> - biological, chemical and physical characteristics of colors - historic and contemporary meaning of colors 	<ul style="list-style-type: none"> - observation of hues and shades - creation of color scales, contrasts, harmonies and rhythms - expressive, functional and communicative use of color 	<ul style="list-style-type: none"> - refined color taste - interest for color usage, experimentation
<p>3) PHOTO, VIDEO</p>	<ul style="list-style-type: none"> - photography and video as an art form: history and aesthetics - techniques, themes and genres - photography and video as a method for exploration: scientific and documentary photography 	<ul style="list-style-type: none"> - basic photographic and laboratory techniques - mixed techniques - methods of analysis of photo and video 	<ul style="list-style-type: none"> - critical attitudes towards press photography and commercial video clips - interest and tolerance for new genres in the media arts - frequent use of photography / filming as an expressive and scientific/documentary means

<p>4) INTEGRATED AESTHETIC EDUCATION.</p>	<ul style="list-style-type: none"> - common structures, themes, expressive and compositional means of fine arts, music, literature and dance - methods of "polyaesthetic" analysis - interdisciplinary approaches in arts criticism 	<ul style="list-style-type: none"> - interdisciplinary analysis of works and genres of the arts - improvisation with common arts structures and themes - revival of the integration of arts forms in folk customs 	<ul style="list-style-type: none"> - positive attitudes towards arts-related experiments and "polyaesthetic" genres of art - observation of similarities and peculiarities of the art forms - preservation of folk art heritage through the cultivation of customs and crafts
<p>5) ART CRITICISM AND HISTORY</p>	<ul style="list-style-type: none"> - facts, data and concepts about styles, genres and iconography - cultural history of the area and its monuments 	<ul style="list-style-type: none"> - verbal and visual methods of art criticism - methods of historical analysis of works of art 	<ul style="list-style-type: none"> - art as an agent of national identity: preservation of cultural heritage - open and tolerant attitudes towards contemporary art

TASKS AND TESTS USED FOR THE ASSESSMENT OF VISUAL LEARNING

Visual abilities tasks and tests

1. ART CRITICISM TASK (Classic painting, modern painting and modern sculpture)
2. CLARK VISUAL CONCEPT FORMATION AND GENERALIZATION TEST
3. VISUAL AESTHETICS SENSITIVITY TEST (VAST), Eysenck and Götz
4. VISUAL NARRATIVE TASK („Draw A Story in Six Frames”!)
5. MALE AND FEMALE FIGURES AND FACES (happy and sad)
6. CITYSCAPE DESIGN, using a set of geometrical shapes given in model form
7. PORTFOLIO of completed works and sketches done during the years of the project

Mental abilities tests

1. *General learning abilities and intelligence:*

RAVEN STANDARD PROGRESSIVE MATRICES TEST,
FAT 7-8/A Intelligency Test by T. Hennig

2. *Attention span:* R1FA ATTENTION TEST by T. Hennig

3. *visual memory:* MOEDE MEMORY TEST

4. *perception of space:*

MCQUERRY NON-VERBAL PERFORMANCE TEST,
RYBAKOFF TEST

5. *creativity:*

- two items from the GUILFORD CREATIVITY TEST: “*Consequences*” , (follow upon an unusual situation or event and “ *Three Lines* “ (composition of a picture with the utilization of three, ore or less suggestive lines)

- Two tasks from the Hungarian version of the TORRENCE CREATIVITY TEST by Il Barkóczy and Cs. Pléh, a verbal task (“*Unusual Usage*”, requiring the listing of the most possible “unusual” uses of everyday objects, eg. a brick) and a drawing task, “*Circles*”.

SUBJECTS OF THE CURRICULUM DESIGN AND ASSESSMENT PROJECT

* grades attended = school grade of the given class at the beginning and at the end of the experiment. All grades are primary (elementary).

** age groups = students of similar ages attending different classes but developed according the same experimental curriculum or belonging to the corntrol groups were united in one age group to compute the overall effect of the given curriculum

Curriculum Focus	Serial No. of Class	School Type	Grades attended (*)	Number of Students	Treatage Groups (**)
1. CRAFTS/D ESIGN	1.	rural	5.-7.	24	1.
2. COLOR	2. 3.	urban rural	5.-7. 5.-7.	27 19	2. 2.
3. PHOTO / VIDEO	4. 5.	suburban suburban	3.-5. 6.-8.	18 34	3. 4.

4. INTEG-RATIVE ARTS EDUCATION	6.	urban	1.-3.	21	5.
5. ART HISTORY AND CRITICISM	7.	rural	4.-6.	21	6.
	8.	urban	4.-6.	23	6.
	9.	urban	4.-6.	24	6.
	10.	rural	4.-6.	25	6.
	11.	rural	4.-6.	27	6.
6. CONTROL GROUPS (CREATION IN DRAWING / PAINTING)	12.	urban	1.-3.	27	7.
	13.	urban	4.-6.	24	8.
	14.	urban	5.-7.	28	9.
	15.	urban	1.-3.	13	7.

**CORRELATIONS OF INTELLIGENCE AND ATTENTION
WITH VISUAL ABILITIES TASKS**

	RAVE N1	RAVE N2	FAT/W ORD1	FAT/W ORD2	FAT/PI CT1	FAT/PI CT2	R1FA1	R1F A2
VAST1 (n=300)								
VAST2 (n=289)				.259**		.271**		
CRIT1 (n=238)								
CRIT4 (n=238)		.217**						
CRIT2 (n=238)								
CRIT5 (n=238)								
CRIT3 (n=238)								
CRIT6 (n=238)		.231**						
HARVA RD1 (n=52)							.366*	
HARVA RD2 (n=46)								
AESTH1 (n=299)	.381**		.270**		.277**		.324**	
AESTH2 (n=296)		.213**						
TECHN 1 (n=237)								
TECHN 2 (n=232)		.242**		.255**		.212**		
CLARK 1 (n=300)								
CLARK 2 (n=288)		.217**						

Significance level: $p < 0.001$ = **

$p < 0.01$ = *

Abbreviations used in Charts 3-6: number 1 after the test name always indicates the pretest and 2 the post-test, executed before and after the introduction of the experimental curricula.

- VAST Visual Aesthetics Sensitivity Test
- CRIT1 Art Criticism Task, Painting, pretest
- CRIT4 Art Criticism Task, Painting, post-test
- CRIT2 Art Criticism Task, Sculpture, pretest
- CRIT5 Art Criticism Task, Sculpture, post-test
- CRIT3 Art Criticism Task, building, pretest
- CRIT6 Art Criticism Task, building, post-test
- HARVARD Harvard Aesthetic Sensitivity Test
- AESTH Visual Narrative Test, Aesthetic Quality
- TECHN Technical Drawing Task
- CLARK Clark Visual Concept Acquisition and Generalisation Test

**CORRELATIONS OF VISUAL MEMORY TEST RESULTS (MOEDE) WITH
VISUAL ABILITIES TASKS**

New abbreviations: OBJ = recollection of objects NUM = recollection of numbers PLACE= recollection of placement of objects and numbers FRAME= recollection of the shape of the frame

	OBJ 1	OBJ 2	NUM1	NUM2	PLACE 1	PLACE 2	FRAME 1	FRAME 2
VAST 1 (n=300)	.216*						.275**	
VAST 2 (n=289)		.223**		.238**				
CRIT 1 (n=238)								
CRIT 4 (n=238)						.455**		.387**

CRIT 2 (n=238)								
CRIT 5 (n=238)						.355**		.262**
CRIT 3 (n=238)								
CRIT 6 (n=238)						.438**		.362**
HAR VAR D1 (n=52)			.405*					
HAR VAR D2 (n=46)						.511**		.531**
AEST H1 (n=299)	.284**				.356**		.277**	
AEST H2 (n=296)						.353**		.260**
TEC HN1 (n=237)								
TEC HN2 (n=232)						.301**		
CLA RK1 (n=300)								

CRIT3 (n=238)			.219 **								
CRIT6 (n=238)											
HARVA RD1 (n=52)											
HARVA RD2 (n=46)		.648 **		.595 **		.620* *	.706 **		.405 *		.362 *
TECHN1 (n=237)											
TECHN2 (n=232)										.271 **	.245 **

- Visual narrative task („draw a story in six frames”!)
- Male and female figures and faces (happy and sad)
- Cityscape design, using a set of geometrical shapes given in model form
- Fat 7-8/a intelligence test
- R1fa attention test
- McQuerry non-verbal performance test
- Rybakoff test
- Guilford creativity test: “ *three lines* “ (composition of a picture with the utilization of three, ore or less suggestive lines)

“Circles”: a drawing task from the Hungarian version of the TORRENCE CREATIVITY TEST

VISUAL NARRATIVE TASK

Instruction: "*Draw a story in six frames!*" An instrument to measure cultural differences, it proved also valid for the detection of design and visual communication skills. Drawings were executed on A/3 format sheets with no frames given, the use of color crayons or felt-tipped pens was allowed. No theme was given or suggested. The completion of a drawing with a title and eventual text took 25 minutes on average. Drawings were scored according to the following criteria: *figure structure* (an indicator of the level of drawing development), *aesthetic quality* (the expressive use of line, shape and color, adequate choice of composition and motives, good proportions and adequate detail in rendering), *narrative structure and content category*(to reveal culturally relevant, characteristic national, regional and individual themes and actions).

GEOMETRIC CITYSCAPE

The task involved a *cityscape design, using a set of geometrical shapes* given in model form made of white paper. This pen-and-pencil task took 45 minutes to accomplish and represented a better drawing level for the majority of students with average drawing ability than purely geometric studies with no representational content.

HUMAN FACE AND FIGURE DRAWING

As small children generally do not - and should not - draw in linear perspective, we decided to use the favorite of psychologists, a variation of the Human Figure Drawing Task by *Goodenough and Harris* with added scores for *expressive quality* (happy and sad faces were required) and *indications of age and sex* (a male and a female figure had to be drawn.) The paper format was A/4, the children could choose a medium colored or black pencil, and 45 minutes were allotted for the completion of two figures and two faces.

ART CRITICISM TASKS

(Classic painting, modern painting and modern sculpture)

The paintings used were Madonna of Esterhazy by Raffaello (Museum of Fine Arts, Budapest, undated), József Egry: Echo (an impressionist painting, 1908, Hungarian National Gallery, Budapest, and Henry Moore: Motherhood, bronze sculpture, Paris, UNESCO Headquarters, 1957) Instruction: " Give a critique of this artwork." Children under 10 were asked to speak about them - their verbal utterances were taped and transcribed. The art analyses of students were scored according to the following criteria:

- *type of interpretation* (ranging from simple description to justified value judgments)
- *quality of the interpretation* (adequate use of methods of art criticism, knowledge about compositional structure, its relationship with content and message, selection of motives, style, master and place of work in oeuvre etc.)

CLARK VISUAL CONCEPT FORMATION AND GENERALIZATION TEST

This test consists of a 25 pairs of reproduction sets. Subjects are asked to study a set of four images that represent a visual concept. Then, another set of three images is shown in which one represents the same concept strongly, another item has some implications for the concept and one is totally irrelevant. Subjects are asked to choose the item that corresponds most with the concept observed on the first set. Scores of 2, 1 and 0 are given according to the answer's level of correctness.

VISUAL AESTHETICS SENSITIVITY TEST (VAST)

BY H. EYSENCK AND K. O. GÖTZ

This test includes 50 pairs of black and white non-representational pictures all made by the German graphic artist Karl O. Götz. One of the images has been changed after completion to create . Students have to discover which of the items has a a certain "anesthetic" effect due to intentional design faults.

Results:

CORRELATIONS OF GENERAL LEARNING ABILITIES WITH VISUAL ABILITIES

- **The “Aesthetic Appeal” item of the Visual Narrative test (VNT)** showed a strong correlation with both the intelligence and attention tests at a $p < 0.001$ level.
- **The Harvard Aesthetic Sensitivity Test (HET)** correlated highly with attention span test results (R1FA). As the HET requires intensive, attentive analysis of aesthetic qualities of music, art and drama, its relationship with the test measuring the intensity of attention may not be a coincidence.
- **No correlations were revealed between the visual abilities tasks and the intelligence tests** (Raven 1, FAT 1) but five of the eight pedagogical tasks were not independent (on a $p < 0.001$ level) from the Raven Test. The Visual Aesthetic Sensitivity Test (VAST) was related to the other psychological measure for analytic thinking: the word and image subtest of FAT. These results suggest that **art education may play an important role in fostering intelligence.**

The post-test shows, however, that these relationships cease to exist with the exception of the HET and R1FA. *With growing age, differences in intelligence will have no effect on the level of visual creation and perception. There is one new connection, however, worth mentioning: the Technical Drawing Task (TDT), that measures a set of skills children in the experimental programs could well have acquired during the training period. Here, intelligence plays a crucial role in understanding and solving geometric tasks. The other, free and creative drawing task - the VNT - will not show correlations with the level of general intelligence at the post-test.*

CORRELATIONS OF VISUAL MEMORY WITH VISUAL ABILITIES

In the pretest, only weak correlation values were identified between the mental tests and the Visual Aesthetics Sensitivity test (VAST) and the Narrative Drawing Task. After the experimental teaching process in the post-test, however, all visual abilities tasks (with the exception of VAST) showed significant, in many instances strong correlation with two items of the Moede test: memory of location and contour.

CORRELATIONS OF SPATIAL ABILITIES WITH VISUAL ABILITIES

The mental tests employed assessed *spatial orientation, judgment of size and proportions, recollection of images in space, spatial imagination, reconstruction and completion.* In the pretest period, only one test item correlated with the visual abilities (the Aesthetic Appeal criterion of the Narrative Test). In the post-test period, only slightly stronger correlations were found. In this area, training proved to be moderately successful - by far less than expected. Apparently, traditional (two-dimensional) art education tasks do not develop spatial abilities. The most successful group of students were those specially trained in design, with a lot of haptic and constructive tasks.

CORRELATION OF CREATIVITY WITH VISUAL ABILITIES

As indicated by a large number of previous studies, generally used creativity tests are not related to creativity in the visual realm. Pupils judged highly talented by their own teachers as well as impartial experts did not score significantly higher than their less able peers.

In search of a more appropriate measure to detect visual creativity, research on the Test for Creative Thinking - Drawing Development (TCT-DP) was launched in 1994 and successfully completed in 1997. This drawing test developed by Klaus Urban (University of Hannover) and Hans Jellen (deceased) shows significant links with creativity as measured by art education tasks.