EU Project “visuaLearning”

Synopsis chart for summaries of national reports

	POLAND
Understanding of visual learning	There is no clear and only one definition of understanding. The most common are as follows: **1) The visualisation** is a **method** that uses the natural skills to create various images in human thoughts. It is a kind of a memory exercise and a work based on images concerning the past, current and future situations – it serves a better processing of these images, making new interpretations and reconstructing past experiences. **2) The visualisation** is a **technique** of better remembering and creating the association systems: a technique of fixing memory „hooks” which allow to remember numbers, quantities, relations, greater narrations, etc. **3) The Visualisation** can be seen as a **style** of learning based on visual channel of perceiving information and on visual representative system, with reference to processing and getting out the contents.
Importance of visual learning in science and practice	- taking into consideration the pupil’s subjectivity in the learning process, his learning style that has **the influence on the organisation of didactic work** (selection of objectives, contents, methods, etc.) - time economy (learning progresses faster) - new sub-fields in didactics (‘work with film’, ‘the use of the Internet’) - learning efficiency, easiness in the reconstruction, permanence - greater clarity in the information transfer - in the practice - increase of the interest - bringing the presented teaching contents closer to the reality - possibility to create natural procedures meant for solving problems, tasks - taking into consideration psychophysical needs of pupils - developing the interests and aspirations of pupils - the increase of self-reliance in the learning process - the increase of cognitive, research and creative activity.
New findings concerning brain research and imagery research	**R. Botwina and W. Starosta (2005)** have conducted research on the **imaginary training.** They perceive the visualization as an optimization method in handball and football training. In their studies they proved that the handball and football players, who instead of traditional exercises imagined that they score the penalties, achieved better results than the sportsmen that took a break in training before taking the penalties. Moreover, the imaginary training was often more successful than the common training of taking the penalties. These results prove that the sportsmen who received an injury or are convalescing should continue with the training in their imagination.
Contributions of different areas of brain for visual learning	A crucial role in the visualisation process plays **the brain**, and strictly speaking its different areas in **the left and right hemisphere**. **The left hemisphere** registers concrete things, e.g. mathematics, logic and words. **The right hemisphere** registers and is activated by music, imagination, creativity, etc. By means of **the left hemisphere** we register words and by means of **the right hemisphere** we perceive visual impressions and the comprehensive image of the presentation. The visual learning progresses used in deductive way – it means bottom-up.

Current models concerning recognition of objects	The image - as a complex sensual information transmitted to the brain - is remembered both as a whole and as a set of detailed elements. Such a differentiation is in accordance with the concept of functional specialization of the hemispheres, according to which the right hemisphere deals with the **overall coding** and the left one **with particular elements** and relations between them. One of **the most popular theory of the memory today is the concept of dual coding** (Bower, 1972; Paivio, 1971) which assumes that we have separate codes for the coding of verbal and visual material. The verbal information is stored as a sequence of words and the visual information is stored in the image memory. So, there is a spatial code for visual coding and line code for the verbal material.
Conditions of visual learning	**1) to engage the right hemisphere**: In order to make learning more effective and to enable visual learning, the right hemisphere should operate using the imagination, colours, rhythm, movement, music, spatial associations and intuition; **2) to define the dominating learning style in the group:** very useful for efficient teaching and for choosing the right didactic materials; Everybody is a mixed type and usually one of the senses dominates over the others. In order to rise the learning quality it is worth to recognise not only one's remembering channel, but also the type of intelligence and the dominating hemisphere; **3) to keep an eye contact:** the excess of visual aids can disperse the recipients. When discussing the text e.g. on the folio gram the speaker has to talk to the listener and maintain the eye contact with him. At the same time the speaker has to be careful and show only this content he is talking about, while covering the remaining information; **4) cohesion:** the lack of correspondence between the visual and verbal ways of knowledge acquisition and the application of solely visual methods can lead to the lack of intellectual consideration and as a consequence the lack of memory traces and learning efficiency; **5) to define the need of visual support:** the application of the visual style is not always substantiated, it often depends on the type of the contents conveyed.
Benefit of visual learning for our target groups (low skilled people, people with reading and/or writing problems etc.)	**Target group in POLAND – adult people learning of foreign languages** Benefits for the target group: • time economy (learning progresses faster) • learning efficiency, easiness in the reconstruction, permanence • greater clarity in the information transfer • help in understanding by means of connotations • usefulness in the visualization of difficult and abstract issues • developing the interests and aspirations of pupils • individualisation of contents, methods, learning organisation • the increase of self-reliance in the learning process • the increase of cognitive, research and creative activity.
What qualifications should teachers have to strengthen visual learning in their groups?	- self-confidence, self-belief and faith in the efficiency of own teaching methods - the knowledge on the role of the left and right hemisphere in the learning process - the knowledge of pupils' learning style and the dominating hemisphere an individual approach in which the needs and the abilities of the pupil and his interest and aspirations are taken into consideration - the ability to stimulate the work of both hemispheres by means of visual, auditory and kinetic systems - the skill of time management and focus on the most important issues - the application of memory maps for making notes - teaching by playing - the knowledge how to use both hemispheres and by means of which methods - clear expectations - the ability to create friendly atmosphere in the classroom - the use of positive, affirmative language

	- the knowledge on the process that takes place in the brain during the stress - the knowledge of the teacher's own learning style and the dominating hemisphere.
Good practice examples	**1) H. Szwajgier (2005)** – a teacher of German in one of the Lublin secondary schools conducted a lesson on tourist attractions in the well-known European cities. The pupils worked with the Internet and their task was to find the pictures of monuments and tourist attractions in the cities in Germany and other countries, as well as the information about them. Based on the collected resources they were to develop a tourist guide throughout Europe in German language. During the presentation of their work the pupils also used postcards, brochures, souvenirs (miniature tower from Pisa, bear from Berlin etc.). Such proposal is didactically valuable thanks to the use of the state-of-the-art medium – the Internet, visual elements, activating methods and authentic communicative situation. **2) J. Wilga and K. Krawcewicz (2005)** described a cognitive activity of pupils during a multimedia exhibition of Goethe Institute „Herzliche Grüβe". The exhibition presented language phenomena located in pavilions that were of different colours and each of them was devoted to a separate subject or to the sensations experienced by one sense (sight, hearing, touch).
Remarks/recommendations/conclusions	**Recommendations:** - the need to give knowledge and ideas on how to use psychology, knowledge of how the brain works and visualisation techniques in order to make the teachers aware and persuade them that this method is not only attractive but in the first place effective. - the need of making teachers aware of and familiar with the opportunities arising from the use of visual methods. - Psychologists emphasise that the main role of visualization should be to support, not to replace the traditional methods. **Conclusions:** - In Poland these methods are used mainly in private institutions during courses of speed reading, accelerated learning etc. In public schools visualisation is not widely applied. - At public schools it is still used as a kind of play, often not fully deliberately. - Polish literature of the subject is based on studies conducted in the years 1950-80. Later publications were not widely distributed and can be mainly found in academic libraries. - Concerning the visualization Polish scientists base mainly on the English and German literature.

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EU Project “visuaLearning”

Synopsis chart for summaries of national reports

	GERMANY
Understanding of visual learning	There is no just one clear definition of visual learning. There are many different disciplines working on the topic, so it depends on their individual scientific background how the topic is interpreted and understood. Therefore the term will be displayed and explained within the frame of the project and its goals. But this definition doesn’t claim to be generally accepted. The following terms derived then and led to the final results of the inquest: visualisation, visual competence, pictorial science, visual perception, visual thinking, visual language, visual telling. Furthermore from the project’s content terms like visual literacy, visual learning and basic skills, perceptive localisation, visual feedback are of interest. The very basic meaning of „visual learning” is portrayed through visual psychophysics: visual learning is the recognition of objects, patterns as well as seeing movements and colours, initially without regarding aspects of cognitive psychology. Since quite a long time the information processing – core content of the cognitive psychology science – is seen as an essential part of the learning process. The approaches of object recognition of the cognitive psychology have been developed in the 60ties and 70ties. Whereas they have been restricted to the schematic representation of postulated steps in processing”. If thinking, acting and planning are understood as an active information processing, the ability of classifying - within the context of object recognition – moves into the centre of interest: “percepted objects are treated equivalent by requirement of their similarity.” (Jüttner, p. 1-2) What has been established as so called “picture-science” (“Bildwissenschaft), offers an ideal framework for inquiry in the term of visual learning. Here within picture-science multidisciplinary almost is requirement for being part of it. Without question it is possible to find and classify relevant aspects under the genus of picture-science within the project’s context. At this point it is necessary to describe the term picture more detailed in order to avoid banality of understanding. “Pictures are signs which are close to apperception” says the thesis of Klaus Sachs Hombach. Therefore pictures on the one hand have a clear character of reference, on the other hand the interpretation of those is relatively to the apperception-standard. “Close to apperception” means that the meaning, which should be communicated with the picture, comes from the structure of the picture (the sign) itself. “In the sense of this thesis we use pictures in order to signalise several aspects of several or fictive objects or issues, that means to make them visible” (Sachs-Hombach, in Huber, Lockemann, Scheibel (Hg.) 2003, p. 19-21) Or elsewise: associations in pictures or images, that have the character of apperceptions, are so called “eidetic phenomena” (Edelmann, p. 167). There exists a specific cultural method – recognising and understanding of pictures, graphics, diagrams, signs etc. so to say of all issues displayed visually not based on text – one can refer as “visual literacy”. Youn- Ju Ko Hoang derived a definition for this term that is taken together from seven several non-German definitions: “”Visual Literacy” is a learnt ability for understanding, recognising, interpretating visual products or messages of several media. To use, analyse, evaluate and self-develop them in a sensuous way within social reality and to be able to communicate them with others” (Hoang, p. 11-12). Furthermore he departs “Visual Literacy” into five components. The ‘conscious perception’, the critical reception, the reasonable use, the active participation and the support of creativity (Hoang, p. 26-28). These terms are substantially to understand literally and are useful for the characterising of the term „Visual Literacy“ and as well as this they show a clear orientation via media-pedagogy. Hoang describes „Visual Literacy“ as an ability of which individual messages should be dealt on diverse levels of experience“. “If this special message has been learnt through the practical use of it, the ability for perception, critics, use and creativity are supported in a better way” (Hoang, p. 28).

Importance of visual learning in science and practice	The topic visual learning nowadays is strongly influenced by an interdisciplinary participation. This is confirmed by different authors, in particular by Klaus Sachs-Hombach. In his essay "Pictorial Sciences – a Interdisciplinary Task" he explains the (historical) development of a (new) pictorial sciences and tries to compare it with the development of the yet established linguistic sciences. Initially the main interest of all scientific activities focused on psychophysics and the neuro-physiological science's results in visual learning. The development of the social-cognitive psychology lead the focus on processes of perception in connection with individual behaviour and was enlarged like this. Whereas the topic still remained within the work of psychologists. Especially since computers are part of almost everyone's daily life, working with a (picture-) screen became a routine task. Therefore the establishment of a pictorial-science is obligatory. The integration into pedagogical contents happened through media-pedagogy. The latter gained importance especially since the dissemination of TV-Sets took place. According to the actual situation one can say that the contributions with the highest relevancy are to find within pictorial-sciences. A field of science which is about to find itself and evolve a new scientific path and at the moment therefore builds upon interdisciplinary. The postulation of Klaus Sachs-Hombach seems to become real through the foundation of the "Virtual Institute of Pictorial-Sciences" ("Virtuelles Institut für Bildwissenschaft" http://www.bildwissenschaft.org/VIB/). Furthermore there exists a great offer of study courses "media sciences". In the fields of computing sciences "design" und "webdesign" findings of visual learning are well-known and are successfully applied **Practice:** Lesson/Theory - Learning types and/or learning preferences are very well present in class and are applied because of their variety of methods. - In the field of basic education/literacy visual learning is integrated in the everyday life of the courses. (images in teaching material, application of learning programmes in basic education courses, partly as well visual methods in basic education and literacy courses). However, here the tutors are lacking a well founded basic knowledge and/or an overview of the available methods. Visual methods are only partly systematicly applied. Advertisements: - In the field of advertisements the findings of visual learning, the image perception and workout are very present. Everyday life: The function of orientation of images in Germany is more and more gaining in importance (e.g. symbols in local public transport, at vending machines, in shops, in public buildings, in art).
New findings concerning brain research and imagery research	Concerning the learning psychological aspects of experiences of different disciplines and different models are relevant in order to demonstrate the importance of the multiple representation of knowledge, of linked thoughtand finally of visual learning.
Contributions of different areas of brain for visual learning	The concept of double coding according to the cognition psychologist Paivio who has delivered a theoretical reason for the impact of images. According to Pavio it depends of the kind of the stimulation, which system (side of the brain) will be activated. The term "dog" can activate a verbal or visual imagination. A coding of both systems enhances according to Paivio the probability that the stimulation will be better registered and remembered later on.

Current models concerning recognition of objects	The following models are relevant: • Findings of brain biological basic like different functions of both sides of the brain. • Different classical concepts are popular e.g. the above mentioned "double coding" of Paivio • Models of the visual memory in the field of learning psychology, furthermore models and theories e.g. "prototype theory", findings of the representation of knowledge (meaningfulness, analogue/visual and acting related representation of knowledge) c.f. the "multiple representation of knowledge" • Assumptions concerning "internal images" and their impact of behaviour (e.g. Bandura and Kroeber-Riel and generally in advertisements). Albert Bandura – well known for his theory in "observational learning" - speaks in the context of the "modelling" based learning about "imaginativeness-pictures. It means apperceptions which are reactivated in the central nervous system (Bandura, p. 34). This model lives from pictures which show cognitive processed information appearing as pictures in front of the internal eye. In the following section the theory's key aspect will be named and it will be explained why it is useful for the project's context. Learning within this model happens here trough „symbolic representations" (Bandura, p. 31). This learning process is influenced by four sub processes: the process of awareness, the process of memory, the process of motor and reproduction and the process of motivation. "Pictures are signs which are close to apperception" says the thesis of Klaus Sachs Hombach. Therefore pictures on the one hand have a clear character of reference, on the other hand the interpretation of those is relatively to the apperception-standard. "Close to apperception" means that the meaning, which should be communicated with the picture, comes from the structure of the picture (the sign) itself. "In the sense of this thesis we use pictures in order to signalise several aspects of several or fictive objects or issues, that means to make them visible" (Sachs-Hombach, in Huber, Lockemann, Scheibel (Hg.) 2003, p. 19-21) Or elsewise: associations in pictures or images, that have the character of apperceptions, are so called "eidetic phenomena" (Edelmann, p. 167).
Conditions of visual learning	Qualification that the own seeing, the own perception is an impression of internal images and that internal and external images are in one context with the perceptionist. Reflexive competence and reflexive Imagination. The ability to see through images; to recognize the product; the competence to think ones way into conditions of the production circumstances, to question them and to discuss them. What intention have the producers? What is the image trying to tell us? The acting orientated competence to have at least in one example the ability of the organization of the realization.and to have experienced different dimensions of ethetical percepton of the organization of the realization.
Benefit of visual learning for our target groups (low skilled people, people with reading and/or writing problems etc.)	• Support of the learning process in the field of basic education/literacy • To organize lessons more interesting with multiple methods • Generally: Orientation in everyday life, enforcement of indipendence
What qualifications should teachers have to	The tutors should have the following basic skills • Important findings of brain research • Basic ideas of gestalt psychology • Information of rules and principles of perception

strengthen visual learning in their groups?	• Imagedesign: well founded theoretical knowledge is necessary – e.g. findings of functions /way of work out/registration of knowledge/images (not the mere application of methods is decisive but also the knowledge of why and how a visual methode works) imagedesignn • Findings and experiences with relevant visual methods. • Knowledge of the learning preferences of the pupils (not in general but concretely of the pupils which will br taught).
Good practice examples	In class; - Work with collages in class - The use of learning programmes in class - etc.Gesturing for the support of understanding of tone, syllables etc. - Probably the exhibition “pictogrammes the loneliness of stones“ “, Stuttgart 2007
Remarks/recommendations/conclusions	To emphasize that visual learning is an important resource To show the potential of visual learning To recognize the significance of visual learning more strongly

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Synopsis chart for summaries of national reports

	IRELAND
Understanding of visual learning	There is no one universally agreed definition for Visual Learning. According to Dr Anne Bamford, University of Technology, Sydney, visual literacy involves many different types of visual communication including: gestures, objects, signs and symbols. Dr. Bamford explains that visual sign systems are everywhere (for example, dance, film, fashion, hairstyles, exhibitions, public monuments, interior design, lighting, computer games, advertising, photography, architecture and art). To be visually literate, she says, a person should be able to: • Understand the subject matter of images; • Analyse and interpret images to gain meaning within the cultural context the image was created and exists; • Analyse the syntax of images including style and composition; • Analyse the techniques used to produce the image; evaluate the aesthetic merit of the work; • Evaluate the merit of the work in terms of purpose and audience; and • Grasp the synergy, interaction, innovation, affective impact and/or “feel” of an image.
Importance of visual learning in science and practice	Visual images are becoming the predominant form of communication in teaching and learning. This means visual literacy is now crucial for obtaining information, constructing knowledge and building successful educational outcomes. The teaching of visual literacy needs to help students to: • Develop critical thinking skills in relation to visual images; • Enhance verbal and written literacy skills and vocabulary and be able to talk and write about images; • Introduce image production, manipulation techniques and software, • Integrate visual literacy across all curriculum areas; • Ensure there is a balance between visual and textual literacies in the classroom; • Be aware of visual literacy principles in the design of teaching and learning objects; • Pose questions to students about images; • Encourage students to look at underlying assumptions that are embedded in the images surrounding students; and • Encourage students to critically investigate images and to analyse and evaluate the values inherently contained in images.
New findings concerning brain research and imagery research	Professor Ornstein of the University of California found that if a person trained to use one side of the brain, they had difficulty with the activities involved with the other side. However if both sides of the brain are stimulated overall effectiveness and ability are increased. Interpreting this into an adult education context, Tony Buzan (1988) highlights that traditional education has focused on the “three R’s” of reading, writing and arithmetic. These are all left brain activities. Traditional education has tended to undervalue the skills and activities involving the right brain. Taking this a step further, Buzan expands that discussions of the left and right brain refer to the upper brain. The upper brain, therefore, handles intellectual activities. Conversley, the lower brain handles emotions and the kinds of activities that the upper brain doesn’t need to be aware of for example, temperature control or digestion. To maximise the potential of the upper and lower brains, Buzan recommends clarifying one’s goals and visualising how they can be achieved. A key point that Buzan makes in relation to adult education is that if the brain is stimulated, no matter at what age, we can learn new things. In order to do this, Buzan recommends developing memory skills. He states that there are two simple rules for developing memory:

<table>
<tr><td>Contributions of different areas of brain for visual learning</td><td>In talking about the potential of the brain, Tony Buzan (1988) notes that it was not until the 20th Century that significant progress was made in understanding how the brain works. Major breakthroughs have been made since then that have implications for educational psychology. Buzan discusses research by Professor Ornstein of the University of California. His research looked at how different activities are handled by the left and right sides of the brain. He found the following:

<table><tr><td>Left brain handles activities related to:</td><td>Right brain handles activities related to:</td></tr><tr><td>Logic</td><td>Rhythm</td></tr><tr><td>Lists</td><td>Colour</td></tr><tr><td>Linearity</td><td>Imagination</td></tr><tr><td>Words</td><td>Daydreaming</td></tr><tr><td>Numbers</td><td>Dimension</td></tr><tr><td>Sequence</td><td>Spacial awareness</td></tr><tr><td>Analysis</td><td>Music</td></tr><tr><td>Other similar activities</td><td>Other similar activities</td></tr></table></td></tr>
<tr><td>Conditions of visual learning</td><td>In practical terms, specific computer and technology training for visual learning for tutors and students. This suggests learning centres should provide more computer equipment and access to computer rooms even when not part of a scheduled computer programme.
Central image banks accessed through CD-ROM or via the Internet would be important.
Colour printing for reproduction of images – images lose their impact when printed in black and white.</td></tr>
<tr><td>Benefit of visual learning for our target groups (low skilled people, people with reading and/or writing problems etc.)</td><td>• Visual learning can be a great way of showing sequence and offers the ability to be able to see and think in more than one dimension.
• Visual learning is an integral part of numeracy and is great for demonstrating ‘maths in everyday life’ such as in photos, sculptures, posters, paintings, walks, shapes, patterns etc.
• Visual learning Visual learning aids creativity and problem solving: images are more emotional and more engaging than words.
• Teaching in visual literacy should be practical, learn by doing rather than being handed a pack.
• Students need to feel comfortable using visual tools and not feeling that it is a crutch or last resort.
• Visual learning helps to make complex visual resources such as maps, charts and diagrams more accessible.
• Visual learning helps students get a sense of shape, space and pattern and an ability to see relationships and interpret data and can link the real world with the mathematical world.
• Visual learning makes it is easy to get ‘buy-in’ from students and is good for confidence building.
• Visual learning offers opportunities to explore and use IT as well as opportunities to develop using new skills.
• There is a danger of students depending on visual cues and of students developing a sense that they don’t need words.
• Visual learning in mathematics can be more time consuming.
• Visual learning can help students become aware how critical awareness is a powerful tool, which can teach learners to question and not just to receive information.</td></tr>
<tr><td>What qualifications should teachers have to strengthen visual learning in their groups?</td><td>• Information on their students’ preferred learning styles
• An open-minded and flexible approach to teaching and learning
• Understanding of what visual learning is
• Ideas of different visual techniques to use with their students
• An interest in visual and creative teaching and learning methods
• An opportunity to avail of in-dept visual learning training</td></tr>
</table>

Good practice examples	Tutors in Ireland stated that selecting visual learning materials and approaches should be a joint venture between tutors and students. Initially, students may rely on tutors to suggest methods and content but as relationships based on respect and equality develop, students usually become increasingly involved in directing the learning process. Visual mind mapping and related techniques A percentage of the contents of teaching sessions to include visual stimuli and visual learning techniques
Remarks/recommendations/conclusions	• Tutors who completed visual learning training courses very enthuastic to try visual learning techniques in the classroom. • Practical tips and visual learning techniques that can be used in the classroom were most useful. • Visual learning techniques can help bothe the teacher and the student, • Visual learning training should be sufficiently long and detailed to allow tutors to understand fully what is involved in using visual learning tools to help adults with literacy difficulties and give them the opportunity to judge whether visual learning tools work best for them. • Students and tutors experienced in using visual learning tools in teaching and learning in ABE should be involved in developing the course to share their experiences and develop ideas. Training courses that do not involve students in a significant way cannot fully communicate the effects of using visual learning tools to overcome literacy difficulties. The only people who can speak about this with an authentic voice are students. • It is important that the "visual learning" tutor training course reflect the philosophy of adult education. The methods used should be those that encourage active learning and participation.

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EU Project “visuaLearning”

Synopsis chart for summaries of national reports

	ROMANIA
Understanding of visual learning	There is no methodologies or definitions for visual learning, but the experts found a common sense for this process as follows: 1. Perceptive visual learning is actually a reading activity (except that the aim of going through the text is different), i.e. the visual content is perceived in a complex way, implying not only the simple reading (i.e. decoding of graphemes and perception of icons), but the interpretative understanding. 2. Through visual learning most people understand learning/teaching by using images or graphic representations or even films, spots, video presentations, etc. Basically, any educational process that involves images, no matter the way they are presented is considered to be a visual learning technique.
Importance of visual learning in science and practice	- Visual learning leads to better and quicker understanding of the processes, the functionality, better anticipation of the problems that might occur, - By visual learning, practical skills form and develop more easily. - It depends on the science and practice, in biological sciences visual learning is important, as well as in the learning practice. - visual learning helps learners to understand and clarify easier the new concept (they are able to see the interrelation between ideas and how is the information organized) - visual learning helps learners to organize and analyze better the information (the learners are able to use diagrams, schemes, imagines to have general view and understand better the relation between a specific aspect and the whole content) - Visual learning helps learners to bring in the new information (they understand and memorize easier if the information is represented and learned by both sides: visual and oral/verbal). - Visual learning helps learners to have a critical thinking (the visualization helps learners to think about the relation between different parts or contents, to have a general view and also to see the details).
New findings concerning brain research and imagery research	Brain research confirms what we know from education research: that educators must make provisions for individual differences in learning styles by providing alternative grouping arrangements, instructional materials, time frames, and so on. Instruction for beginning language learners, in particular, should take into account their need for context-rich, meaningful environments. Individual differences in learning style may not be a simple matter of personal preference, but rather of individual differences in the hardwiring of the brain and, thus, beyond individual control. The understanding of the brain is continually evolving, thus the researchers’ interpretation of the implications of findings from brain-based research for teaching and learning also continually evolve. Brain research cannot prescribe what teachers should teach, how teachers should organize complex sequences of teaching, nor how teachers should work with students with special needs. Teachers should not abandon their traditional sources of insight and guidance when it comes to planning effective instruction. They should continue to draw on and develop their own insights about learning based on their classroom experiences and classroom-based research to complement the insights that are emerging from advances in brain research.

Contributions of different areas of brain for visual learning	The individual collects information about the object through the senses (sight, smell, hearing, tactile, taste), combines them and achieve the perceptive image. This image is then overlapped on the representations that already exist until finding the matching pattern. Thus the object is designated as being part of a category and recognized.
Current models concerning recognition of objects	Starting from the **Gardner's theory,** which defines at least 7 types of intelligence: visual/spatial intelligence, verbal/linguistic intelligence, logical/mathematics intelligence, body/kinaesthetic intelligence, musical/rhythmic intelligence, interpersonal/intrapersonal intelligence and naturist intelligence, ***visual/spatial intelligence*** is regarded as the type of intelligence which facilitates the learning process by vivid perception of colours, lines, shapes, space as well as of the relation between them. By visual learning students can visualise, and graphically represent spatial images, and can perceive their own position in space. Also, by visual learning, students can easily memorize and recognize the objects.
Conditions of visual learning	1. Visual learning it's emphasize a way or another (inductive or deductive learning) term of the level of knowledge of the object by subject, if exist a mental representation, term of the quality of representation, of the perceptive experience of the subject/person. 2. Also, there is another important condition of visual learning: to be a visual person. In that respect the teacher must to know the learning styles of his/her learners and to choose the teaching methods taking into account about these characteristics. 3. Another important condition of visual learning is the coherence of the contents of learning. It is very important the correspondence between the visual and verbal way of teaching the content of learning.
Benefit of visual learning for our target groups (low skilled people, people with reading and/or writing problems etc.)	- visual learning conveys a wide range of concrete information facilitates the mental representations making and is approachable for understanding. - if visual learning is emphasized, the concrete thinking is developed ; - the understanding and the memorising of the concepts is easier; - by visual methods, learners have concrete examples
What qualifications should teachers have to strengthen visual learning in their groups?	- to be empathetic and to understand easily the learning needs of the learners, - to have knowledge about the learning styles in general, and also, out the learning styles of their learners - to know a wide range of visual method learning and to adapt the proper method to the content of learning and to the learners needs - to have very good communication skills (to be aware about the impact of his behaviour on the process of teaching); a good teacher must to create a friendly atmosphere in his/her class, must to be an open minded and a god example for the class - to use both visual and traditional method of learning. - to identify clearly the learning needs of learners and to adapt the content of the methods to these needs.
Good practice examples	The internet allows access to papers and articles (in Romanian) which promote new technologies as a resource for the development of visual/spatial intelligence (e.g. http://www.intime.uni.edu/model/Romanian_Model/teacher/teac1summary.html). On of these article mentions the use in some new schools of electronic panels, or huge screens or monitors. Teachers and students may be involved in the design of visual messages for display, using materials e.g. from document files or directly from computer networks. One can foresee in the relatively near future virtual reality when all present simulations are pale by comparison. This new world generated by computer has just started to use propose learning methods which enable memorisation in new dimensions. A student with a helmet which contains a miniature monitor, headphones and an electronic glove. This equipment is connected to a computer which coordinates the sensorial input with the physical movement. The computer monitors the location of the gloved hand and creates real experiences.

	The article mentions that one of the first programs enabled the participant to go on a street in Aspen, to notice the surroundings and even to change the seasons of the year. When the participant reaches the corner, by positioning the electronic glove, he can turn right or left to explore the surroundings. Little imagination is necessary to foresee the learning experiences which will be offered to students in physics, chemistry and medicine. This visual-spatial equipment is tools for the learning process which develop students' visual-spatial intelligence and facilitate the access to various topics for a larger number of students. They will be of a real help for physically disabled students or for students with special needs.
Remarks/recommendations/conclusions	Recommendations (as the Poland partner's mentioned above): - the need to give knowledge and ideas on how to use psychology, knowledge of how the brain works and visualisation techniques in order to make the teachers aware and persuade them that this method is not only attractive but in the first place effective. - the need of making teachers aware of and familiar with the opportunities arising from the use of visual methods. Conclusions: - Regarding the visual learning, in Romania, we are facing some competence as well as attitudinal limitations – this situation varies, of course from one institution to another (for example, in some colleges visual learning is more used, but keeping its status as an alternative mean). - the visual methods are mainly used in adult learning in private training programmes (professional courses and foreign language courses) and in primary schools as reading learning method: *a global method* (learning is based on visual memorisation of words and sentences) and a *semi-global method* **(**pupils decipher letters and syllables, memorising at the same time words and sentences and work on their understanding; this method is an alternative one, it is not mandatory, but it has been adopted by 90% of the primary school teachers, and they use it with or without a textbook) - another instrument used in visual learning are the computer. In Romania educational software has become very popular lately and it uses several visual learning techniques (Image communication, Visualization, Visual facilitating), the main objective is to create interactive learning situations by increasing the student's involvement *in the learning process. There are used various diagrams, images, drawings, etc. with the role to facilitate the connection between previous knowledge and the newly acquired information. An example of highly popular educational software for the development of mathematic skills for secondary school students is „Geometrie: între joc şi nota 10",* developed by INTUITEXT™ .

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EU Project “visuaLearning”

Synopsis chart for summaries of national reports

	THE NETHERLANDS
	The first year of this project was completed before the Dutch partner Reflexion joined the partnership, therefore some research and development issues had been dealt with already by the other partners in the course of the project and could not be addressed by Reflexion given the time constraints.
Understanding of visual learning	Common learning theories as available, known or used in The Netherlands do not give an appropriate answer to the question how learning happens through visual processes. The question about the influence of pictures in the learning process as well as the reception is left to disciplines related to arts, e.g. design, advertising, etc. and has not yet been posed by adult educators in particular. A common definition may be borrowed from Wikipedia: *“Visual learning is a proven teaching method in which ideas, concepts, data and other information are associated with images and represented graphically. Graphic organizers, such as webs, concept maps and idea maps, and plots, such as stack plots and Venn plots, are some of the techniques used in visual learning to enhance thinking and learning skills. By representing information spatially and with images, students are able to focus on meaning, reorganize and group similar ideas easily, and make better use of their visual memory.”*
Importance of visual learning in science and practice	In sharp contrast to the situation in the other participating countries, as described in this overview and the national reports, there is not only a lack of clear definitions in The Netherlands of what visual learning is or should be, but there seems to be a rather general lack of interest in the subject as such, at least at the level of scientific research. For those who would seek thorough knowledge about the theoretical background of visual learning, little is available. In fact only one scientist produced a standard work on the subject and it is almost half a century old: Prof. Dr. J.M. Peters, *Visuele communicatie en visueel onderwijs: over de rol van beelden in het communicatieproces en over het gebruik van audio-visuele hulpmiddelen*, Haarlem, Technische Uitgeverij H. Stam, **1961**. Of more recent date is (from the same author): Prof. Dr. J.M. Peters, *Het beeld: bouwstenen voor een algemene iconologie*, Antwerpen-Baarn, Hadewijch, 1996 Discussions about (the added value of) visual learning methods seem to be more or less restricted to the field of special education, especially when dealing with children with special educational needs. While borrowing from materials that were meant and designed for very young learners, similar materials are presented to children with learning difficulties, making abundant use of illustrations and other (computer and web based) ways of visualizing information and instructions. A fine example of such an approach in an international context can be found on www.on-line-on.eu, the website of the ONLINE project. This website and it’s content is the result of European cooperation funded by the Leonardo da Vinci programme of the EC. A similar approach will be adopted by the GAMBE project, addressing the learning and integration needs of people with psychiatric problems: results will be published during the first semester of 2008 on www.gambe-leonardo.eu.
New findings concerning brain research and imagery research	See reports by other partners, we have found no evidence or results of specific Dutch research efforts in this area.

Contributions of different areas of brain for visual learning	Visual learning applications like mind mapping address and appeal to the whole brain. They stimulate cooperation between the left and the right hemisphere. Our left hemisphere is mostly used for mathematics, language and analysing. The right hemisphere is used for creative processes. It works with images, colours and shapes. Education traditionally makes an appeal to the left hemisphere, so a huge part of the brain capacity is not used. Mind mapping is therefore a perfect solution for students having problems in that particularly part of the brain. For example; for some students with dyslexia, mind maps can help to structure information more easily and in this way help them to remember the information
Current models concerning recognition of objects	Nowadays, students grow up doing homework while watching TV and doing almost everything while listening to an Ipod. Many of them feel much more comfortable doing more than one thing at a time than their fellow students in the past. They have spent their entire lives surrounded by and using computers, videogames, digital music players, video cams, cell phones, and so on. They have little patience for lectures, step-by-step logic, and "tell-test" instruction. Students are used to scanning a text (in books but also on a monitor) instead of reading. It is clear that today's students think and process information fundamentally differently from their predecessors. Marc Prensky refers to these students as *Digital Natives*. Our students today are all "native speakers" of the digital language of computers, video games and the Internet. Others call it the E-generation. We need to invent new educational methodologies for this new generation.
Conditions of visual learning	First of all, the general awareness of the innovative power of using visual stimuli in the learning and teaching process should be enhanced. Our national research indicated that applications of visual learning techniques in education are quite limited in number, the promotion of visual learning as such is certainly not a national issue. At the same the introduction and implementation of new tools and instrument definitely is a key issue in the Dutch educational system. Teachers seem to be well motivated to implement new methods, as soon as they have proven their value. What is lacking is a general scientific backup with theories concerning the learning process, providing a general framework for the introduction of visual applications in the classroom. Innovation may be stimulated by applications that have found their way to the business area: a technique like mind mapping is well accepted in business management, establishing the next step forward in brainstorming, for which it provides a structured approach. The Digital University for instance describes the use of concept maps for Academic Writing, Business Analyses and other courses. From there such applications have found their way into the academic realms where their users have a kind of "posh status": using mind mapping techniques is perceived as quite up to date and innovative. Further spreading into the other levels of education and society will automatically follow, but merely based on evident advantages for daily practice, not on thorough scientific backup. One may compare this development to the introduction of the mobile phone: no-one argued that it is better than a classis phone and still it is replacing it on a massive scale.
Benefit of visual learning for our target groups (low skilled people, people with reading and/or writing problems etc.)	As pointed out above, visual learning methods seem to have gained more ground in the field of special education than elsewhere in education. Especially when dealing with children with special educational needs, visual stimuli are considered highly relevant and useful. While borrowing from materials that were meant and designed for very young learners, similar materials are presented to children with learning difficulties, making abundant use of illustrations and other (computer and web based) ways of visualizing information and instructions. It will surely take more effort than this European project could provide, to achieve large scale introduction and acceptance of visual methods in (for example) adult education or regular vocational education. The emphasis in most learning materials is still on textual instructions and explanations, supported by information tables and images. These images (photographs, drawings) often serve as a divertive illustration rather than as a supportive instrument for the instruction process. Of course the introduction of PC's and especially the emergence of web based learning environments have made the learning environment more visual by being based nowadays on intuitive, visual interfaces, but we are still far from a systematic application of visual learning methods and instrument, based on well accepted theories, throughout the hole educational sector. In the meantime, when asked about visual learning, probably nobody would dispute the potential advantages.

What qualifications should teachers have to strengthen visual learning in their groups?	Offering a qualification workshop like the one provided to teaching professionals in the framework of this project, is fine as a first step. Next to this, or preferably as a result of this, there should by more systematic awareness in the teacher training process (also post-graduate) of the specific value of visual learning. In general we may expect sincerely motivated teachers to be genuinely interested in any new and effective approach that would improve their own teaching. As long as the Dutch educational system **and** educational science is hardly aware of the benefits of visual learning, the teachers operating within that system will be hardly equipped to use any of the innovations as "discovered" in this project. For sure, this is a pity: it probably takes no more than an open mind and a general qualification as teacher to be able to adopt visual learning techniques.
Good practice examples	Apart from pointing at the previously mentioned websites of two Leonardo da Vinci projects (www.gambe-leonardo.org and www.on-lin-on.eu (especially the Mentor Training course), both dealing sideways with the issue of visual learning, we should also mention some fine examples of using the concept of visualisation in education: About "Visual Poetry" and language visualisation: Henk van Faassen, *Opvattingen over visuele poëzie en de toepassingen ervan in het basisonderwijs*. This document and many others can be found on http://taalvormingentaaldrukken.nl/index.html, one of the few websites we found giving a more extended overview of methods and didactic ideas to apply in education. The website deals with various target groups of regular education, like illiterate children and children with learning problems. Interesting lecture: Jos van den Broek, Veilig Visueel Communiceren, Van Marum Lezingenreeks Stichting Weten (www.weten.nl) The most informative (but commercial) site on visual learning found so far in The Netherlands: http://www.leren.nl/cursus/leren_en_studeren/actief_leren/visueel_schema.html. Mind mapping for children is presented on a page introducing the Visiria software package *Kidspiration:* http://www.onderwijsmaakjesamen.nl/index.php?paginaID=22&itemID=499
Remarks/recommendations/conclusions	For sure additional research and development is needed to promote effectively the introduction of visual learning in te Dutch educational system, both as a concept and as a set of methods and tools. The quality of the concept would certainly gain by producing more differentiated short courses, dedicated for instance to specific sub-items of visual learning, instead of dealing with all implied and related subjects in one course. Emphasis should be shifted to practical applications in the classroom (and other settings for teaching and learning), the theoretical packages could be presented separately as a backup reader for those who are interested in theories of Gardner and other great thinkers in the field. For a teacher involved in daily teaching detailed knowledge of the operation of the brain is of secondary importance: he or she likes to apply effective and attractive techniques. Teachers should be facilitated primarily in the teaching process, the neuropsychological background is most certainly of less importance in their perception.

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