

Søknad Formidlingsprogrammet (PROREAL)

Komputer + Kunst = Kjærlighet

K+K=K

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Vårt prosjekt er basert på antagelsen om at teknologi og informasjonsteknologi spesielt, kan forstås, verdsettes og mestres når den blir brukt i kreative selvrealiserende aktiviteter. Ved selvrealiserende aktiviteter, som en konkurranse hvor deltakerne leverer inn et bidrag, oppnår man både læring og mestring. For å nå programmålene vil prosjektet K+K=K etablere en konkurranse hvor elever lager kunstverk innen sjangeren ny mediakunst (New Media Art) med informasjonsteknologi (IT) som fokus. Kunstverkene må være laget ved hjelp av IT-teknologi og/eller reflektere rundt IT relaterte tema. Prosjektet sørger for assistanse og veiledning for elevene. Prosjektets fokus er å profilere utdannings- og jobbmulighetene innen IT, samt å skape entusiasme og interesse for fagområdet (M1, M2). Konkurransen skal utløse elevens, og forhåpentligvis spesielt jenters, interesse for IT (M4). Kunstverkene vil bli levert digitalt og presentert gjennom en nettportal. Publisitet rundt konkurransen VIL bidra til økt interesse rundt IT-faget generelt og beslutningstakernes forståelse for viktigheten av IT-kompetanse (M1, M3). I tillegg til medieomtale og selve kunstverkene vil prosjektet bygge opp under et ungt miljø tilknyttet IT-teknologi og bidra til nettverksbygging i dette miljøet. I tillegg vil bidragene utgis i bokform. Et utvalg av gode forbilder fra IT-industrien og forskningsintitusjoner, vil delta i prosjektet, hvorav noen som jurymedlemmer. Et utvalg av bidragene vil, i tillegg til å bli presentert i bokform, bli tilgjengelig i digital form på nett. Prosjektet vil bli knyttet til velkjente arrangement som Forskningsdagene. Konkurransen, nettportalen, sluttarrangementet, boka og de utvalgte kunstverkene vil bli markedsført gjennom TV, radio og internett. Bidragene og boka vil danne grunnlaget for en videre formidling av IT til elever og til samfunnet generelt (G2, G4). Essensen i prosjektet er å synliggjøre og profilere IT i det offentlige rom som noe håndfast.

1. Relevance

PROREAL program has the following goals:

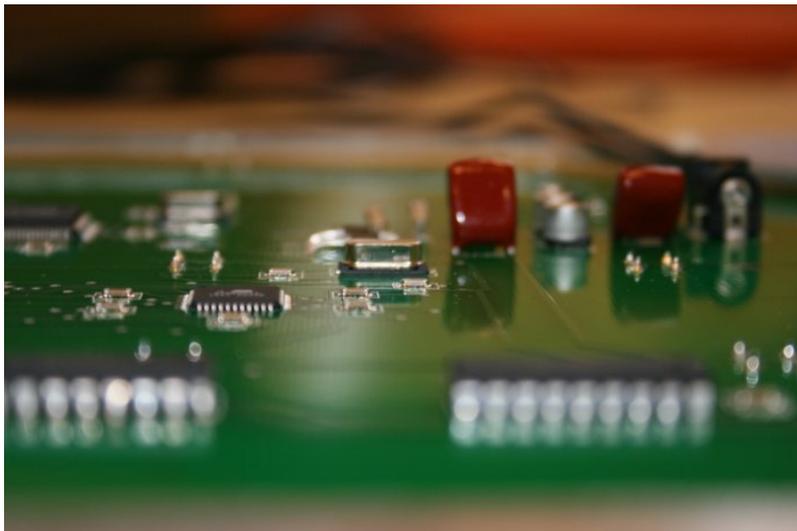
1. Contribute to strengthen the knowledge and the interest for science in general in society
2. Disseminate the possibilities in science education and career
3. Contribute to increase the understanding of science competence for decision makers
4. Increase recruiting to science studies in general and among girls in particular

The goals of the K+K=K project have been designed by customizing the PROREAL goals to the theme of Information Technology with focus on pupils of age from 13 to 15. The essence of the project is to *make IT visible and tangible in the public arena through new media art.*

2. Background and status of knowledge

2.1 Information Technology

In 1963 there was only one computer in Norway. This computer is called GIER. It came from USA to Trondheim by flight and it was used by researchers and students at NTH (now NTNU) in Trondheim. GIER is now a museum piece in the basement of the IT building at NTNU. At the time of writing (2008) there are millions of computers in Norway. There is at least one personal computer (PC) in each home and on each desk. Each cellular phone, camera, washing machine, electronic game has a computer system inside. Banks, hospitals, schools, cinemas, airports, telephone and oil companies, just to cite some important examples, are all dependent and influenced by complex systems of inter connected computers.



Information Technology (IT), is about the study, design, development, management of computer-based systems, particularly software applications and computer hardware. IT professionals perform an important, influent, and interesting job as they work together in teams to design and manage complex computer networks and information system that are at the heart of the organization of our society.

IT is a general term that describes any technology that helps to produce, manipulate, store, communicate, and disseminate information in all branches of our life.



2.2 New Media Art

New media art can be defined as works of art where information technology (IT), or concepts from IT, plays an important role. New Media Art is promoted by many festivals where artists exhibit their artworks, communicate their ideas and concepts, often evaluating and/or criticising contemporary phenomenon. Examples include Ars Electronica (<http://www.aec.at/de/index.asp>), PixelACHE (<http://www.pixelache.ac/>), Read_me (<http://readme.runme.org/>), Transmediale (<http://www.transmediale.de>), Piksel (<http://www.piksel.no/>), Make Art (<http://makeart.goto10.org/2007/>), Trondheim Matchmaking (<http://matchmaking.teks.no/>). These festivals are place for artists and technologists to meet, exchange ideas, discuss future cooperation and create collaborative

projects. Participation, however, is not limited to the practically involved artists and technologists. New Media Art festivals attract and provoke the whole society.



At NTNU, the project SArt (<http://prosjekt.idi.ntnu.no/sart/>) focuses on the exploration of research issues in the intersection of art and software [1-3]. Well established international research programs, like the Xerox's interdisciplinary artist-in-residence program at Palo Alto [4], the MIT Media Lab (www.media.mit.edu), Creativity and Cognition Studios (www.creativityandcognition.com) or the Swedish Interactive Institute (<http://w3.tii.se/>) exemplify that art and technology often have mutual interests and benefit from cooperating. The research results of the SArt project show that new media artists generally touch upon advanced, emerging and novel technological themes (for example mobile and wearable computing, robotics, surveillance, bio-technologies, etc.) for the production of their artworks. When new media artworks come in contact with its public, awareness, curiosity, and reflection about technology arise.

2.3 Learning and motivation

Figure 1 presents the Major Choice Goals Model. Recommendations on how to inspire students to pursue computing degree can be found in [5, 6].

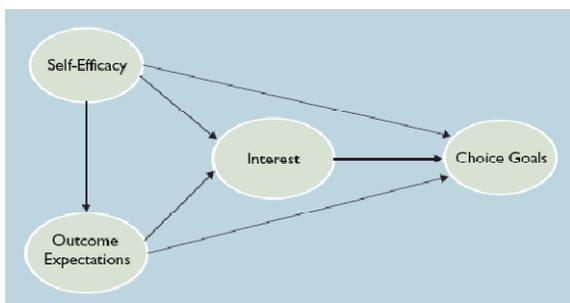


Figure 1: Major Choice Goals Model, source [5].

Research results in [5] show that the main factor that influences on the students' choice for major to study is interest. Students intrigued by particular domain are likely to pursue education and career in this domain. In educational settings the interest can be influenced via novelty and complexity. Novelty can be instated trough access to content and information that is fresh, cool and current (for example mobile technologies, MP3, games). Different delivery approaches, like interactive content, videos, discussions, guest speakers, etc. might positively influence on students' interest and curiosity, leading also to



more pro-active search for further information. Besides interest, two other factors influence students' choice of educational major - outcome expectations and self-efficacy [5]. Outcome expectations factor is related to existence of potential employment, expected sense of pride, prospect of achievements and rewards, gaining admiration and being recognized as competent. Outcome expectations might be increased by providing rich information and putting students in contact with industry professionals and successful researchers, which serve as inspiration (i.e. role models). On the other hand, self-efficacy refers to the pupil's judgments and confidence to perform effectively in a computing/scientific major.

Concerning women in ICT, several approaches are suggested in [6] and [7]: to increase the visibility of young women in computing-related fields, to challenge traditional stereotypes and images of computing-related fields, to diversify current images of computing-related fields, to show the breadth of fields that computer science and related areas can encompass, to spark interest in the science of computing and the challenges of problem solving, to provide an interesting and enjoyable learning experience, to provide leadership, role modeling and mentoring opportunities. Moreover, in the Women@SCS program at Carnegie Mellon University (<http://women.cs.cmu.edu/>) the importance of a community and a dissemination action to expand horizons of middle-school girl pupils is outlined.

Summing up, to stimulate pupils to pursue computer science or technology related education and career, pupils' interest in the domain should be increased by provoking their curiosity, increasing their self-confidence and providing rich information about their future career perspectives.

2.4 Main choices and assumptions

The main assumptions in K+K=K are:

- Cooperation:** we are aware of several good initiatives at National and International levels which have goals that are similar to our. Here we mention <http://www.forskningsdagene.no/>; <http://www.mesterhjernen.no/>; league <http://hjernekraft.org/>; (ROSE- teknologi <http://www.skolenettet.no/>); <http://www.viten.ntnu.no/>; (Newton Camp Tekna og DNT); <http://www.firstscandinavia.org/>; <http://www.renatesenteret.no>. K+K=K aims at achieving cooperation and synergy with these initiatives by being in a continuous dialog with the members of our network (See Table 1) and the initiatives above (which are mainly connected to our network members) while retaining its main profile that is *make IT visible and tangible in the public arena through new media art*. One important goal is to make our project attractive to school teachers and let them use our project and its resources for their teaching activities. Teachers have to be involved from the beginning to help shaping the project in a way it fits with the learning plan. Another goal is to manage to exploit the big possibilities of NTNU's education and research resources to increase knowledge and awareness about IT issues in schools. Here, concretely we will exploit the Experts in team village of Jaccheri on the theme of Art and IT to connect University students to school pupils. It will be crucial to get support from the IT industry. Here we refer concretely to the company Bouvet (see attached letter of intention). Finally we will all the time link the project to society. Here we refer to André Martinsen, Dagblad photographer, who expresses his interest of being a jury member in this project. It is crucial to present the project as an attractive resource to schools (both pupils, teachers, and administrative personnel) that they can use to achieve their goals. In Norwegian Ungdom schools IT is not a specific



<http://shift.no/>; . (lego prosjektet - naturfag og (vitensentere

subject but it is something that should be covered by each subject, like art, Norwegian, society knowledge, etc. The big challenge for our project is that to look attractive for several subjects and for pupils that elsewhere would not have been attracted by IT issues. Here I cite a Ungdom school teacher “boys want to play with computers, girls want to create something with it”.

- **Reflected trade-off between traditional and IT based communication channels:** The web site will be an important communication channel. It will provide information about the competition itself, including description of relevant themes, examples of new media art works with focus on their underlying technology. The portal has to describe the Jury, the prizes, and there must be services, like chat lines, to connect the pupils to the experts. After competition, the WEB site will show the submitted artworks and the winners. Mailing lists, discussion forums, wikis and blogs will be made available and continuously updated, instigating pupils’ regular visits to the web site. The web site will provide rich information about educational and career possibilities, both in Norway and worldwide (this can be done for example by referring to existing sites like shift.no). To attract Norwegian pupils’ interest/attention and to stimulate pro-active search of additional information, printed materials (fliers, posters, etc.) will be created and distributed in Norwegian schools. These will strongly focus on IT themes and clearly refer to K+K=K’s web site. Several variations of posters/flyers, which might be distributed in consecutive time periods, will guarantee drawing and keeping the attention of pupils and their teachers. The competition, its winners and artwork, and the organized supportive activities (meetings, seminars, etc.) will be announced and presented in the media, triggering further interest in society for the selected IT themes. At the end of the competition an edited book will be published with selected artworks and distributed to participants of the competition and all Norwegian Ungdom schools.
- **Role models:** Special attention will be paid on putting the pupils in contact with industry professionals and successful researchers, which will serve as inspiration. Video messages, seminars (on-site and/or online), streaming and/or downloadable presentations on the selected IT themes will provide intriguing and important information to the pupils. Many of these will be led by women, increasing the ‘can do’ mentality in girls (i.e. self-efficacy).

3. Objectives

See attached application form

4. Project plan

See attached application form and attached document activities.pdf.

5. Budget

Requested to NFR 1 MNOK, total 1.8 MNOK. See attached application form.



6. Project management, organization and cooperation

Lead Partner: NTNU Professor Letizia Jaccheri, PhD, will be the administrative leader of the project. Jaccheri is with the Department of Computer and Information Science, Norwegian

University of Science and Technology (NTNU). Jaccheri is a professor at NTNU since 2002. In the last five years she has been involved in the supervision of at least ten PhD students. She has more than fifteen years experience with research projects, both at National level (Italian and Norwegian) and International. In 2006 she won the price of the disseminator of the Year at IME NTNU. Jaccheri has written the book "Cuore e Computer" ("Kjærlighet og Computer"). She has also been heavily engaged in cooperation with the Trondheim art scene and NTNU's Faculty of Architecture and Fine Art, she is active in the Open Source Software (OSS) community as well as being a visible role model for female computer scientists and engineers.

Jaccheri has actively participated to the interdisciplinary efforts Experts in team, which is the biggest pedagogical effort ever developed at NTNU with 50 University teachers cooperating across different disciplines. Jaccheri is member of IKT committee for TEKNA and has relations to TEKS (Trondheim Center for Electronic Art). She has connections both in the network of Norwegian IT organizations and in the network of new media artists in Norway (mainly through the annual Trondheim MatchMaking festival www.teks.no). Jaccheri has participated to ULF Ungdommens LitteraturFestival 2006 leading a workshop about IT-texts for Ungdom schools pupils. Jaccheri is an active blogger and has written chronicles to newspapers, has been interviewed on radio, TV, and newspapers. See the attached CV or <http://www.idi.ntnu.no/~letizia> for more details on research, education, and dissemination activities.

7. Perspectives and compliance with strategic documents

7.1 Compliance with strategic documents

K+K=K is compliant with the strategic documents at both Norwegian and European level. At Norwegian level, [8] has been published by the Norwegian Government. It is a strategy plan for enforcing the scientific subjects and recruiting students to science and technology. At European Level, [9] and [10] suggest some important steps to create an innovative Europe and to use IT to shape Europe future. [9] insists in the importance of Creativity in Products, Services and Digital Media. The media consumer will no longer be just a passive viewer but she will become an active creator, mixer, promoter and collaborator, and 'hot spots' will enable context-sensitive interactions.

7.2 Relevance to society

IT plays a fundamental role in innovative societies, like the Norwegian one, and the demand of IT specialists is increasing. Many sector of the society, health, government, transport and logistic or environment have increased their link with IT. The oil industry understands the importance of IT and invests in research and development. The final goal of K+K=K project is to boost the number of pupils, boys and girls, that are attracted by IT in a multidisciplinary view.

7.3 Environmental perspectives

New collaborative technologies continue to lead to more work efficiency, lower cost and growing employee satisfaction while lowering environmental effects. Working through a web portal in a community is important to learn how to collaborate with low impact to the environment. Green IT is one of the themes pupils are invited to reflect about.

7.4 Ethical aspects

Ethical issues will be addressed as suggested in [11] and [12]. For our project, important issues are: to reject bribery in all its forms; to improve the understanding of technology, its

appropriate application, and potential consequences; to maintain and improve our technical competence and to undertake technological tasks for others only if qualified by training or experience, to seek, accept, and offer honest criticism of technical work, and to credit properly the contributions of others; to treat fairly all persons regardless of such factors as race, religion, gender, disability, age, or national origin. Moreover, since our project involves human subjects, personal data must be sufficiently anonymous to guarantee adequate protection of privacy. ‘Ethical issues in IT’ is one of the themes pupils are invited to reflect about. These rules will be discussed by project members and rendered visible to project users.

7.5 Gender equality and gender perspectives

This project takes an integrated approach to gender equality. The project manager is a female professor. We build on the program “Women in Computing” at NTNU to ensure a balanced gender perspective. Jaccheri has participated to the thematic ESTIA-Net, a program of the European Commission/ Directorate General for Education & Culture/ Higher Education. In ESTIA-Net project interdisciplinary issues are evaluated to be the main factor to influence woman participation to ICT issues.

8. Communication with users and exploitation of results

The main target users are Norwegian pupils of the Norwegian “Ungdomskole”. We foresee that pupils will work while they attend the first or the second year and they will receive the price at the beginning of the second or third year.



We want pupils to increase their enthusiasm about IT in a way they choose, in future, science studies (realfag kompetanse) at high schools (videregående). In addition, there are the dissemination effects on the Norwegian society that will be exposed to the content of our project during publicity in newspapers and other media. Fourth, the competition portal will be available to all Web users. Last, the edited book will be available in English for purchase and distributed to both all participants and to all (approximately 1000) Ungdom schools in Norway. Communications with the users is the most important and critical factor. We want to reach our main target, the pupils and to do so we have to be in dialogue with school teachers and administrators in a way that our project is seen as a resource in several subjects, like science, mathematics, art, Norwegian, English and other foreign languages, society, exercise, and religion. The web site will be exploited to access information about IT issues and their relations to other subjects. As a concrete example, we mention <http://jilltxt.net/> by the researcher Jill Walker Rettberg at the intersection between poetry, literature, and IT and that intersects with new media art. Moreover the web site will be populated by the art works

produced by the pupils which will serve as mutual inspiration and community building. The book will contain an excerpt of the material on the web site and it will be important for dissemination to the pupils who will start their study after project end. The media attention to the competition is directed to society and decision makers who will be invited to reflect about the importance, the nature, and the consequences of IT from new perspectives.

9. References

- [1] Jaccheri, M. L. and G. Sindre, "Software Engineering Students meet Interdisciplinary Project work and Art", in 11th International Conference on Information Visualisation (IV) Zurich, Switzerland, 2007.
- [2] Trifonova, A., S. U. Ahmed, and L. Jaccheri, "SArt: Towards Innovation at the intersection of Software engineering and art", in Proceedings of The 16th International Conference on Information Systems Development Galway, Ireland: Springer, 2007.
- [3] Trifonova, A., L. Jaccheri, and K. Bergaust, "Software Engineering Issues in Interactive Installation Art", *Inderscience Int. J. of Arts and Technology (IJART)*, vol. 1 (1), 2008.
- [4] Harris, C., "Art and innovation: the Xerox PARC Artist-in-Residence program", C. Harris, Ed.: MIT Press, 1999, p. 293.
- [5] Akbulut, A. Y. and C. A. Looney, "Inspiring students to pursue computing degrees", *Commun. ACM*, vol. 50 (10), pp. 67-71, 2007.
- [6] Frieze, C., O. Hazzan, L. Blum, and B. Dias, "Culture and Environment as Determinants of Women's Participation in Computing: Revealing the 'Women-CS Fit'", in Thirty-Seventh SIGCSE Technical Symposium on Computer Science Education 2006, Houston, Tex., USA, 2006, p. 5.
- [7] Frieze, C. and E. Treat, "Diversifying the Images of Computer Science: Carnegie Mellon Students Take on the Challenge!" in Proceedings of the 2006 WEPAN Conference, Pittsburgh, Pennsylvania 2006, p. 12.
- [8] Regjeringen (The Norwegian Government), "Et felles løft for realfagene: Strategi for styrking av realfagene 2006–2009", KunnskapsdepK+K=Kmentet, Ed., 2006.
- [9] ISTAG, "Shaping Europe's Future through ICT", Information Society Technologies Advisory Group, Ed.: Information Society Technologies, 2006.
- [10] EUR 22005, "Creating an Innovative Europe: Report of the Independent Expert Group on R&D and Innovation appointed following the Hampton Court Summit and chaired by Mr. Esko Aho", Office for Official Publications of the European Communities 2006 — VIII, Ed.: European Union Publications Office, 2006.
- [11] IEEE, "IEEE Code of Ethics", IEEE Board of Directors, Ed., 2006.
- [12] NENT, "Guide to Research Ethics (Forskningsetikk for forskningsråd)", 1992.

Table 1: National and International Network

Member	Role	Contact
Frode Tveit and Kari Lindholm IBM Norway	Connection to industry	www.ibm.com/no/FTVEIT@no.ibm.com 66998517
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jj.no	New media agency	jostein@jj.no 73 51 80 70

Member	Role	Contact
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