Improving presentation skills in the context of software project management teaching

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ABSTRACT
The development of oral competency is a must for all bachelor programmes. As a broad discipline in the field of computer science, the importance of presentation skills is also unquestionable. This paper describes an initiative where computer science students assembled in groups; define a themed software solution project. Throughout the initiative, students face a set of oral presentations aimed to develop their presentation skills. Authors describe how students face the project and the presentations and their evolution over-time. Suggestions for the limitations and potential of the strategy deployed and the tools designed to improve their skills are discussed.

Categories and Subject Descriptors
K.3.2 [Computer and Information Science Education]: Computer science education. K.3.2 [Computer and Information Science Education]: Information systems education.

General Terms
Human Factors.

Keywords
Presentation Skills, Education, Software Engineering Management.

1. INTRODUCTION
Presentation skills are horizontal competences for all university studies. Consequently, presentation skills are considered fundamental transferable skills to new undergraduate programs adapted to the Bologna Declaration or ABET criteria. In computing studies, and more precisely in software engineering studies, where software development is a human centric activity [6, 9] presentation skills are also of key importance. Communication skills development among computing students has been an object of study since the seventies [11] and the eighties [8]. More recently, the guide to the software engineering body of knowledge (SWEBOK) [1], included presentation skills among the aspects in communication skills that are needed for software engineering professional practice. This initiative underlines the importance of presentation skills throughout the software life cycle and states the influence of such skills in aspects like product acceptance, management, stakeholder's management and customer support.

Presentation skills are also included in the Software engineering body of skills (SWEBOS) [15]. In this initiative, presentation skills are part of the generic non-technical skills, defined as abilities that are not core for software development and are relevant also for other disciplines, although they can be considered highly relevant for practitioners' skillset.

In the last version of the Joint Task Force on Computing Curricula (IEEE Computer Society & Association for Computing Machinery) curricula efforts devoted to bachelor studies on software engineering topics was issued back in February 2015 [4]. In this effort, presentation skills are present in the Professional Practice knowledge area (PRF.com.4) under communication skills. This structure is reflecting also the approach adopted in SWEBOK described earlier. Presentation skills are also mentioned in the Curriculum Guideline 8: Students should be trained in certain personal skills that transcend the subject matter. More precisely, they are present in the "Communicating effectively" activity. Finally, presentation skills are also mentioned in the Curriculum Guideline 14: The curriculum should have a significant real-world basis as a part of the project-based activities.

With regards to the Graduate Degree Programs in Software Engineering, the most recent experience is the Graduate Software Engineering 2009 (GSwE2009) initiative conducted in the Stevens Institute of Technology and connected with the Joint Task Force on Computing Curricula [2]. However, the initiative is only focussing on core areas, leaving professional practice aside. Consequently, professional practice skills are not covered in the curricular initiative.

Scientific literature reported in several studies on the importance of presentation skills in software engineering curricula in several aspects. In [10], authors indicate that general business topics are not covered in software engineering studies proportionate to their importance, citing presentation among other aspects. For Ardis & Henderson [3], presentation skills are still key for software engineering education in the era of MOOCs. The importance of presentation skills for software project managers education is also highlighted in [13] as also underlined in [7, 14]. In the works of Nylen and Pears [12], authors witness the importance of practice, reflection, review from lecturer and, to a lesser stent, peer review in the development of effective presentation skills.

In order to develop Presentation Skills, the set of applied techniques range from the Stanislavski method [18], to presentations development [17] or Role Play techniques [16, 17]. Such initiatives are quite popular and they count on literature and tradition in educational research.

This paper is devoted to report on the efforts conducted at Østfold University College aiming to improve the education quality and yield of future computing practitioners. The rest of the paper is structured as follows: Section 2 introduce the initiative launched at the Faculty of Computer Sciences at Østfold

University College, to develop presentation skills for computing students. Section 3 presents the study conducted including observations, results and discussion. Finally, Section 4 conclude the paper, presenting main conclusion while suggesting future work.

2. THE COURSE

In this section, authors present the experiences that take place at the Faculty of Computer Sciences, Østfold University College, Norway in the venue of an undergraduate course in which students are aimed to work together in a group project and must present their work in a subsequent set of presentations. In this paper, the main features of the course, the materials, the censors and the project itself are depicted.

Østfold University College is offering four bachelor programmes in the broad field of computing, namely: Computer Engineering, Digital Media Production, Computer Science and, finally Information Systems. Project Management is a course available for undergraduate students from Computer Science, Digital Media Production and Information Systems. Project Management covers 10 ECTS and is scheduled for the last year of studies in the autumn semester. It included four hours of lectures and two hours devoted to group efforts and workshops. In the course, lectures by course responsible are combined with guest lectures from IT practitioners.

Evaluation is based on group project work. It accounts for two different components: first, the project is assed evaluating on project output considering the list of deliverables on both the quality of their final deliverable and the quality of the process to obtain them. The second assessment factor is an oral exam performed in groups. The exam is based on a previous presentation by students on their project.

There is also a midterm assessment of the materials designed to prevent potentially sizable deviations and to capture more data on the process and the participation of students.

3. THE STUDY

Authors present in this section, the design of the research conducted, sample composition and data collection methods. Results are also presented.

3.1. Design

During the fall semester 2017, students developed their group project. It covered the planning, administration and pre-design of a game targeted at demographics from the available ecosystems (PSP; Windows, iOS, Android…). Students were asked to come up with a plan (including make believe development and launch schedules), define monitoring and control mechanisms for the project, draw and assess risks, define the main features of the game, build a mood tape, stablish the set of tools to use and build the game upon them, estimate effort, cost and time and present their results to an audience. In a nutshell, emphasis was placed on management aspects of the production of the game rather than the technical aspects of it. All these tasks were communicated at the beginning of the course and scheduled to be delivered sequentially.

Fourteen groups were formed by students to develop the game. Two sets of questionnaires were completed by students. In the first week of the course students filled an initial paper based questionnaire to auto assess their presentation skills. All students present in the classroom answered the questionnaire. Before carrying out the task, all participants received instructions from the research-teaching team. The mission of research group members was to assist respondents during the process and, in case of need, further explain questions and procedure. Afterwards, raw data from the questionnaires was manually coded by means of a commercial statistical analysis software.

In the last day of the course, students were instructed to perform a final presentation of the project. After that, students filled a new questionnaire repeating the process performed in the first days of the course.

The global objective of this study is to analyse the initiative to improve student presentation skills and understand its repercussion from the students' viewpoint. The questionnaire was designed to serve to this aim, but also analyse different factors of presentation (Comfort, Importance…) not covered or analysed in this paper. In the questionnaire designed, two sets of questions were asked to students. The first set was devoted to asking for factors not covered in this paper. The second set of questions was devoted to analysing aspects of presentation skills: voice, content and discussion; also with some regards to planning and preparedness. For each of the questions, a five-point Likert scale was adopted and included in the questionnaires. Students were assisted on site by lecturers who gave them all the directives required to fill out the questionnaires.

Questionnaire is presented in ANNEX 1. Authors want to underline that questionnaire is anonymous.

3.2. Sample

The sample consist of a set of 59 subjects in the first questionnaire and 55 for the second one. The difference in the population is rooted in the fact that four students disenrolled from the course.

Regarding the first questionnaire: two blanks failed validation and the final set reached 57 valid responses. The average age was 23.52 years old and a standard deviation of 3.43 years. With regards to demographic characteristics, the sample included 8 women (14.04%) and 49 men (85.96%). Literature reported traditionally a gender imbalance as a particular characteristic of IT students population [5]. Regarding the composition of the sample with regards to bachelor studies, 21 students came from computer science bachelor studies (36.84%), 21 students came from information systems bachelor studies (36.84%) and finally 15 students came from digital media production (26.32%).

Sequentially, the second questionnaire: one blank response failed validation and the final set reached 54 valid responses total. The average age was 23.77 years old and a standard deviation of 3.21 years. The differences on the previous reported figures can root in the time spent between the two actions (Around four months) and the slight but remarkable difference between the two samples, including the questionnaires discarded that are initially random. Sample included 6 women (10.53%) and 51 men (89.47%). Finally, regarding bachelor studies, the composition was 19 students form computer science bachelor studies being 35.19% of the sample; information systems bachelor studies 21 students and 38.89% and finally, digital media production, 14 students and 25.93% of the sample.

3.3. Results

In this section, authors will go through the results also considering analysis provided from the two sets of questionnaires. The authors analyse basic data and present statistical methods to investigate the evolution of presentation skills.

The set of presentation skills' evolution is measured in the last part of the questionnaire. A total of thirteen questions are included to measure different aspects of presentation skills with regards to general aspects, voice, content and discussion. All aspects are assessed by means of a Likert scale (1-4). Table 1 presents the evolution in these 13 aspects by including an aspects average and a standard deviation of the initial and final questionnaires.

Table 1. Evolution of presentation skills

	Initial		**Final**	
	Average	*SD*	*Average*	*SD*
Eye Contact	2.63	0.771	2.85	0.684
Presentation style	2.45	0.754	2.85	0.596
Timekeeping	2.54	0.867	2.81	0.617
Clarity/expression	2.45	0.777	2.87	0.584
Tone/ volume	2.67	0.787	2.89	0.664
Speed	2.40	0.651	2.76	0.581
Structure	2.54	0.680	2.94	0.529
Report Content Outline	2.32	0.759	2.57	0.944
Level of appropriateness	2.75	0.739	2.91	0.680
Use of visual aids	2.55	0.777	2.72	0.787
Handling of questions	2.47	0.847	2.85	0.737
Listening	3.07	0.776	3.13	0.646
Responding appropriately	2.58	0.778	3.09	0.680
GLOBAL	2.57		2.87	

Overall, the observed values are higher in the final questionnaire than in the initial one, as can be seen in the differences in the global means. All values present higher values in the final questionnaire also, being "Responding appropriately" the aspect with higher increment followed by Structure and Style of presentation. There are also aspects presenting modest increments e.g. "Listening" with an increment of 0.06 followed by "Level of appropriateness" and "Use of visual aids".

To find out if statistical differences existed between the first and the last questionnaire, the statistical t-test was applied. As shown in Table 2, for almost all cases, except for the marked in bold, significant differences do not exist.

Table 2. T-test analyses between initial and last questionnaire

	Student t Test
Eye Contact	t(54)= -1.589, p>0.05
Presentation style	**t(54)= -3.124, p<0.05**
Timekeeping	t(54)= -1.887, p>0.05
Clarity/expression	**t(54)= -3.227, p<0.05**
Tone/ volume	t(54)= -1.604, p>0.05
Speed	**t(54)= -3.033, p<0.05**
Structure	**t(54)= -3.525, p<0.05**
Report Content Outline	t(54)= -1.539, p>0.05
Level of appropriateness	t(54)= -1.198, p>0.05
Use of visual aids	t(54)= -1.142, p>0.05
Handling of questions	**t(54)= -2.502, p<0.05**
Listening	t(54)= -.438, p>0.05
Responding appropriately	**t(54)= -3.694, p<0.05**

Observing the results presented in Table 2, six aspects present significate differences namely: "Style of presentation", "Clarity/expression", "Speed", "Structure", "Handling of questions" and "Responding appropriately". This set corresponds to approximately half of the aspects measured. Some of them have to do with more formal aspects, like "Style of presentation" and "Structure", while some others, are linked to performance factors.

Regarding the different viewpoints of students considering their efforts, Information Systems students presented statistical differences in "Clarity/expression" ($t(21)= -2.140$, $p< 0.05$), Structure ($t(21)= -2.514$, $p< 0.05$) and Responding appropriately ($t(21)= -2.434$, $p< 0.05$). Computer Science Students presented differences in "Handling of Questions" ($t(19)= -2.116$, $p< 0.05$) and "Responding appropriately" ($t(19)= -2.532$, $p< 0.05$). Finally, Digital Media students present significant differences in "Style of presentation" ($t(14)= -2.289$, $p< 0.05$). Overall, the differences are inconsistent among groups This demonstrate a diverse background within the concentration; which is contradictory to the increased similarities observed among computer science and information systems students, disciplines appertained to core computing studies.

In order to investigate how similar answers among groups of studies were, the ANOVA analysis was adopted to compare answers among groups in both questionnaires. Results showed no differences among groups in the initial or in the final questionnaire.

Finally, the gender aspect. Considering the unbalanced sample, it cannot be safely analysed without concerns on validity.

Apart from the numerical feedback, qualitative feedback was also collected in the questionnaires - for instance: some students reported the difficulty on presenting their works in English, given that this is not their mother tongue (facing a presentation in another language also constitutes a challenge for students), the importance of the preparation of the presentation in advance or the valid instructions given to students by lecturers.

On the other hand, some students also reported problems in understanding the work to be done in the course (that adopted a learning by doing approach) and the need to devote time to the set of presentation scheduled for the course.

There are two different perspectives in skills development for the course. Performed by means of continuous feedback from lecturers - are external censors. Students receive feedback from their presentations based on the subjective feedback from a set of observers. Incidentally, the questionnaires provide them with a set of key considerations on their skills and level in each of them, a heightened inter- and intrapersonal awareness is also observed because of their self-interpretation while reading the questionnaire.

4. CONCLUSIONS

In this work, the authors depict an initiative around promoting and developing presentation skills for students enrolled in computing based studies. The authors introduce the settings of the study conducted and main results of it. Apart from the encouraging results from students, the course received a general positive feedback from students, external censors and lecturers alike.

Agreeing that the study is just introductory, results and lessons learnt can be of interest for the teaching community. This is because, presentation skills are present in curricula development in all disciplines.

As future works authors would like to expand current work by adding more years in the sample for the current course and by adding new courses (similar or dissimilar) to measure different approaches and initiatives, summing up aspects for students enrolled and disenrolled in the course at the end of their studies.

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THE QUESTIONNAIRE

Østfold University College

Age:_____
Gender: Male ☐ Female ☐
Study: Informasjonssystemer ☐ Informatikk ☐ Digital Media ☐ Other ☐

How comfortable are you in performing presentations in front of an audience?
Not comfortable at all ☐; Somehow uncomfortable ☐; Comfortable ☐; Very Comfortable ☐

Your knowledge about how to do presentations (the structure and how to perform)?
Very limited ☐; Somehow limited ☐; Sufficient ☐; Good ☐

How prepared are you usually?
Not as prepared as I should be ☐; Somehow not prepared ☐; Prepared ☐; Very well Prepared ☐

Do you think you are dynamic in delivering presentations?
Not Dynamic at all ☐; Somehow not dynamic ☐; Dynamic ☐; Very Dynamic ☐

How effective are you in the use of presentation tools?
Not effective at all ☐; Somehow not effective ☐; Effective ☐; Very Effective ☐

How important do you think the use of dedicated advanced illustrations are?
Not important at all ☐; Somehow not important ☐; Important ☐; Very important ☐

How important do you think the development of presentation skills is for you and your career?
Not important at all ☐; Somehow not important ☐; Important ☐; Very important ☐

How are your own skills at the present?

	Very poor	**Poor**	**Good**	**Excellent**
Presentation Skills				
Eye contact	☐	☐	☐	☐
Style of presentation	☐	☐	☐	☐
Time keeping	☐	☐	☐	☐
Voice				
Clarity/expression	☐	☐	☐	☐
Tone/ volume	☐	☐	☐	☐
Speed	☐	☐	☐	☐
Content/ Material				
Structure	☐	☐	☐	☐
Report Content Outline	☐	☐	☐	☐
Level of appropriateness	☐	☐	☐	☐
Use of visual aids	☐	☐	☐	☐
Post presentation discussion				
Handling of questions	☐	☐	☐	☐
Listening	☐	☐	☐	☐
Responding appropriately	☐	☐	☐	☐

GENERAL COMMENTS: