Student-Student Role-Play to Teach Oral Communication Techniques: Experiences from the Spring 2004 Offering of TDT4250 Modelling of Information Systems

Guttorm Sindre
Department of Computer and Information Science
Norwegian University of Science and Technology (NTNU)

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Abstract

In the early phases of software development, such as problem analysis and requirements engineering, oral communication techniques play a central part. Analysts typically gather knowledge by interviewing stakeholders or by facilitating group sessions where several stakeholders participate. In many university education programmes, however, such oral communication techniques are often addressed only superficially. Part of the reason may be that they are costly to teach and assess in a more elaborate way, while written assignments are much more easily administered to a large class. In the graduate course TDT4250 Modeling of information systems at the NTNU, we attempted to address oral communication skills by delegating to the students to role-play both as analysts and customers, and to have them peer-assess each other’s analyst performances. The learning intervention was positively evaluated by the students in a post-task survey, indicating several interesting observations as well as ideas for further improvement.

1. Introduction

In the early phases of software development, such as problem analysis and requirements engineering (RE), oral communication techniques play a central part. IS analysts and requirements engineers typically gather knowledge by interviewing stakeholders or by facilitating workshops where several stakeholders participate. In university education, such oral communication techniques are often neglected [1], and people skills come out as under-taught in the survey by Lethbridge [2]. Although there are a lot of project courses around, many of them start out from given requirements, thus mainly addressing design and later phases. This is also the case for the software engineering project that the NTNU students take in their second year [3]. The superficial coverage of oral communication techniques is also evident by looking at standard course material and the type of exercises often used in courses covering early phase techniques:


- The “traditional modeling exercise” (and ditto exam question) often used to train and assess practical skills in IS analysis or RE does not address oral skills.

By “traditional modeling exercise” we mean assignments that typically start off with a case description written in natural language, and then leave the student with the task of making a corresponding specification in some modeling language. While such assignments do give students the opportunity to exercise their skill at using the modeling language, they also have certain shortcomings:

- The task is more or less reduced to mere translation, i.e., from natural language to some modeling language. In real life, you normally do not get the needed information from the stakeholders in such a dense form, and the task is one of understanding the problem and
negotiating meaning rather than just translating a description from one language to another.

- True, the teacher can deliberately make the case description vague and incomplete to hinder mere translation. But in such cases, assignments tend to ask the student to make additional assumptions where clarification is needed. In industry, an analyst would have to check assumptions with the stakeholders, not just make them.

Hence, this type of assignment only exercises the students’ ability to make models based on written sources of information, and even then in a way which does not resemble the process of synthesizing needed information from written sources in the real world. The ability to make models based on oral communication with various stakeholders is not addressed.

_TDT4250 Modeling of information systems_ is an elective course for 4th year students in a software engineering master program at the Norwegian University of Science and Technology (NTNU). During the last decade it has had from 20-50 students per offering. The focus of the course is on languages and techniques for IS analysis and requirements modeling. Before 2004, oral techniques were addressed only to a limited extent, and many of the practical exercises were of the traditional type, starting from natural language case descriptions. Although there was no particular student dissatisfaction about this, it was decided to update the course to illustrate better how modeling is really done in industry, and to give the students a better feel for oral communication techniques. The challenge, however, was how to accomplish this in a way which provided a positive and effective learning experience for the students, but yet without an enormous increase in the staff time spent on the course.

The rest of the paper is structured as follows: Section 2 discusses various ways to train oral communication techniques in university course settings. Section 3 then presents the learning intervention (i.e. course update) that was chosen for TDT4250 in the Spring term of 2004. Section 4 then reviews the pedagogical evaluation of the learning intervention. Section 5 provides the concluding discussion and outlines ideas for future offerings of the course. Appendix A shows an English translation of the questionnaire used, and Appendix B shows the raw response data.

2. Practical approaches to teaching oral RE techniques

To train oral RE techniques from an analyst’s perspective, the students will need some “customer” or “end-user” to talk to (e.g., someone to interview, or to give a group session for). There are basically two different options: either one can get a real customer, or someone can role-play as customer. Several universities have interesting approaches to this, although only a few are published. Indeed, the students who take TDT4250 also have another course, TDT4290 Customer-Driven Project [9], where students in teams of 6-7 are assigned to a real customer (e.g., company) with a real problem to be solved. This project goes all the way from pre-study and requirements analysis through to coding, testing, demo, and end-report. While this project exposes the students beautifully to many different real-world problems, and generally receives very positive feedback both from students and alumni, it still has some shortcomings when it comes to offering practice in oral requirements elicitation techniques:

- Of the 6-7 students in a team, normally only 1-2 get the role of customer contact. The others will thus have only limited communication with the customer. Similarly, the final presentation and demo of the team is normally done only by 1-2 students, the others again deprived from that kind of oral training.
• Whatever interviews (or other oral communication) the group may have with the
customer take place without staff involvement, and thus without staff feedback. The
focus both for supervision during the project and for the final grade, is on the written
deliverables. Hence, oral RE techniques as such are not really a topic of the course, just something the students have to do to reach the end result.

In a way, the limited focus on oral activities in TDT4290 makes sense. It would be a
lot more demanding for graders also to take the process into account, and possibly quite
disruptive if staff were to accompany students to their meetings with the customer to
assess, e.g., their interview performances. Also, it might be intrusive to demand that
every student in a team should perform at least one interview with a customer, and this
would also be unpopular with customers (e.g., if they thereby have to give almost
duplicate interviews to several students, thus spending more time than strictly
necessary). The hook that makes the customer-driven project popular with Norwegian
companies is that the project is taken through to coding and testing, so that they
actually get a software product for the mere cost of the contact persons’ interaction with
the students – hence the customers are not interested in churning about with extra
interviews or other oral sessions just for the sake of student training. What we have
realized, is that there are actually two different teaching needs here:

• RE in the large, where the requirements work takes place in the context of a
  much bigger project effort, and where the focus (of teaching and evaluation) is
  the overall project result, i.e., producing a good requirements specification and
  then following it through to design, coding and testing.
• RE in the small, with the goal of exercising specific techniques, e.g., interviews.
  The topic of instruction would then be: how to perform a good interview, and the
  questions of assessment: was this a well-performed interview? were accurate
  notes taken? … – not so much if it later leads to a good product.

It then seemed a sensible division of responsibility to let TDT4290 keep on
addressing RE in the large, whereas TDT4250 would address requirements elicitation
techniques in the small. This could still be done using real customers, but then probably
requiring payment (since the customers do not get software in the end). Such an
approach is chosen by the University of Lund, Sweden, where a deal has been
negotiated with a taxi company, whose employees (mostly drivers and call centre
operators) are paid by the hour to let themselves be interviewed by students about their
needs for a new IS. By the means of payment, this opens up the opportunity to dwell
more on requirements elicitation than what a real customer company might be willing to
do for free.

The use of role-played customers/end-users can also be found in several university
courses. Neil Maiden at the City University of London runs a course where – if budget
allows – professional actors are hired to role-play industry customers in student
projects. In years when the budget is too limited, role-play must be done by the teachers
themselves. Another interesting approach to this can be found at the University of
Skovde, Sweden, where each teacher supervises one project team and plays several
roles versus the students (i.e., wearing different hats, depending on what person in the
fictitious customer company the students want to talk to). Teacher-student role-play is
probably the most widespread approach in project courses where requirements are
indeed to be (rather than starting from a given specification), i.e. teachers and teaching
assistants will play customers versus the students.

Still, there is also another option, namely student-student role-play, where students
would act both as customers and analysts. One publication describing such an approach
is [10] (note however that the publication focuses on experimental observations on the
effectiveness of different elicitation techniques, not on the pedagogical effects of the assignment). Here, students from a graduate CSCW course played customers while graduate SE students played analysts. Each customer group were provided with the same fictitious case description prepared by staff, describing the customer company, various employees that would be role-played, and their need for a meeting scheduler system. These written descriptions were not to be shown to the analyst teams, who were only allowed to elicit knowledge from the customer teams using groupware tools.

3. Introducing oral exercises, Spring 2004

For TDT4250, a full customer-driven project was out of the question, since this was already done by another course (TDT4290, but with limited focus on the elicitation techniques as such, as mentioned above). Neither did we have a budget for hiring external personnel to be interviewed by the students. So the options were role-play, either teacher-student or student-student. Although there were only 32 students in the course, it would be a considerable burden for staff to role-play as customer for all these students. To give each student 1 hour of oral practice, 32 staff hours would be spent just conducting the oral activities. There is also a potential problem if a staff person is going to role-play as customer and at the same time try to assess the student’s performance as analyst, so possibly one should spent 2 staff hours per student hour of interviewing (one to role-play, one to assess). Moreover, the staff persons (1 lecturer + 2 teaching assistants) would also have to spend considerable time preparing one or more fictitious customer cases on which the elicitation sessions could be based. Finally, we see a long term potential to move the teaching of oral elicitation techniques (which is not necessarily a theoretically advanced topic) to a compulsory 3rd year course in IS analysis, if a couple of trial runs in our elective 4th year course TDT4250 are successful. Since the 3rd year course has approximately 200 students per offering, teacher-student role-play will not scale up. Hence, we opted for student-student role-play. Unlike [10], we chose to keep the role-play within the course (rather than finding another course whose students could be customers). Also, we chose to have the students themselves develop the customer cases, rather than providing something from the staff. All in all, therefore, the elicitation exercises were to be conducted in the following manner:

1. The students were grouped in teams of 4. The teams were further grouped in pairs (e.g., Team A would be customers for Team B and vice versa). All in all there were 8 teams.

2. Each team had to develop a “customer case”, i.e., a fictitious company they were going to play when posing as customers. The case description had to be delivered to the teaching assistants for quality assurance, but not to the analyst team, who would rather elicit information through oral sessions. The purpose of this step, therefore, was simply to force the students to make themselves sufficiently familiar with the inner workings of their fictitious company that they would be able to play their roles in a faithful manner, and the teaching assistants could demand extensions if they felt that the delivered material was too thin.

3. A stripped down version of the customer case was then delivered to the corresponding analyst team. This brief version contained no models or other detailed insights, only some “factual” info about the fictitious company and a few vague sentences why it has contacted a consultancy to analyze its problems (which is information that a real-world consultant would probably have before showing up to do an interview), plus a list of employees that might be interviewed.

4. Interviews (1:1) were then performed, each student in an analyst group interviewing one student in the corresponding customer group for approximately 30 minutes. The 3 other members of the customer group were silent observers during the interview, evaluating the interview performance assisted by a form provided by staff. Hence, each student got to be
5. Based on the input from interviews, each team (as analysts) made a draft requirements specification.

6. This draft requirements specification was then discussed in a group session (requirements workshop) lasting for approximately two hours. In the requirements workshop, each member of an analysis team got to be facilitator for approximately 30 minutes, and scribe for another 30 minutes. The 2 member of the analyst team who were neither facilitator nor scribe (at any particular time) were meanwhile silent observers, evaluating the facilitator performance assisted by a form provided by staff.

7. Based on the workshop input, each student team wrote a final report for these exercises, containing an updated requirements specification, together with some self-evaluation of what they had learnt through the exercises.

While the detailed case descriptions prepared up front by each team (as customers, Step 2) were necessary for the purpose of role-play, they also contained material that was relevant to other learning goals of the course, since the students had to do some modeling in this deliverable, e.g., ER or UML class diagrams of concepts in the fictitious company’s problem domain, and DFDs or UML activity diagrams showing business processes and the job tasks that the different characters were involved in. Moreover, the deliverables would contain some text, such as information about the company (name, location(s), #employees, products/services, major suppliers and customers), an explanation why the company has hired a consultancy to look into the possibilities for improving the company’s information system (possibly including paper forms or screen sketches of a current manual or automated IS that the company is dissatisfied with), and textual descriptions of the role that each of the 4 team members would play as interviewees (e.g., name, age, position, responsibilities, personality, former IT experience, …).

Since the course curriculum is a collection of research papers, it has been normal to change some papers from one offering to the next. To provide a theoretical foundation for the elicitation exercises, some papers covering requirements elicitation were included in the readings [10-13], at the cost of some slightly dated papers about other topics. The purpose of including these papers was to provide a deeper understanding of the role of various elicitation techniques, as well as a better connection between the practical exercises and the more theoretical parts of the course. Also, we produced two “How to” leaflets for the students, containing practical tips on performing requirement interviews and workshops, respectively. These leaflets, about 5 pages each, were based on written sources such as the textbooks mentioned in section 1, as well as personal experiences in the teaching staff.

Of course, the introduction of the oral exercises had to come at the cost of something else (as the course credits were to remain unchanged), so we had to remove some of the many “traditional” modeling exercises that had previously been used in the course, where written case descriptions were the starting-point for the assignment. However, this is a type of exercise which the students also have in many other courses in the study program, thus considered a bearable loss.

4. Pedagogical evaluation

4.1 The evaluation instrument

There are two typical ways to evaluate learning effects of teaching activities. Either one can look at student performance, where improved performance after the activity would indicate learning. And / or one can look at student perceptions, i.e., collecting
student opinion about the effectiveness of the learning activities. In our case, the performance-based alternative seemed difficult to achieve – this would have required that students performed several interviews and requirements workshops during the term, so that a potential increase in skills could somehow be measured. Since the course contained many other topics than requirements elicitation, there was limited time, and it would also have been logistically complicated to run a much higher number of elicitation sessions than we did (e.g., problems reserving a sufficient number of rooms). Hence, the main focus of pedagogical evaluation will be the students’ perception of the learning effectiveness of the oral exercises. This was evaluated through a questionnaire for which we received the 14 responses to a questionnaire investigating the students’ perceptions about their learning. As can be seen the response rate for the questionnaire was only 44% (not all students were present when the form was handed out, and not all present handed it in). The questionnaire was based on a generic instrument presented in [14], which is partly based on Bloom’s taxonomy [15], with constructed items for Knowledge, Skill, and Attitude, which are all assumed to contribute to overall and long-term learning. This instrument can also be used for investigating hypothesized relations between the various constructs, but for space reasons, we here concentrate on what is most important for the purpose of this paper, namely the detailed results for the various constructs rather than the overall relationships.

The customization of the instrument for this particular learning intervention included two different breakdowns:

A) Looking at the learning effect of different sub-activities (e.g., preparing business case, performing interview, being interviewed, …).

B) Looking at the achievement of different learning goals, categorized as Knowledge, Skill or Attitude goals.

All the items were to be answered in a 5 point Likert scale format, except some questions on the time spent on the various parts of the exercises, and some process improvement questions. The questionnaire was written in Norwegian and presented to the students on four pages of A4 paper, to be answered by pen or pencil. An English translation of the questionnaire is shown in Appendix A.

4.2 Reponses to the questionnaire

Analysis of the instrument itself: The instrument was investigated for construct validity and reliability. All the Likert scale items were found valid. As shown in Table 2, some of the constructs had high reliabilities, while others were lower than 0,7 (which is often considered the acceptable level). This indicates that more care needs to be taken in formulating learning goals to ensure that they are clear and precisely defined. However, it must also be noted that some of the constructs are multi-faceted, e.g., the questions about Learning Effectiveness consider the learning from many different activities, and for instance, a student may have learnt much from one activity (say interviews) and less from another activity (say workshops), which would reduce the reliability for the overall Learning Effectiveness. When looking at questions for interviews and workshops separately, these achieve high reliabilities.

<table>
<thead>
<tr>
<th>Table 1: Item Reliabilities</th>
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</thead>
<tbody>
<tr>
<td><strong>CONSTRUCT</strong></td>
</tr>
<tr>
<td>Knowledge</td>
</tr>
<tr>
<td>Skill</td>
</tr>
</tbody>
</table>
Evaluation of Latent Variables: shows the summary statistics for each construct. All variables score above 3 on a 5 level Likert scale (where score 1 = “learnt nothing” and 5 = “learnt very much”). While it would of course have been better if the averages had been above 4 (meaning almost general consent among the students that the learning intervention was very effective), it is still encouraging that all the constructs score above 3. The best score, Attitude, is nearer 4 than 3. Still, there is clearly room for improvement. As will be seen when looking at more details, the low score for Learning Effectiveness is mostly due to the fact that some of the activities were less valued than others. The mediocre score on Skill can also be considered a disappointment, to be discussed in more detail when looking at the observed variables.

Table 2: Summary of Construct Items

<table>
<thead>
<tr>
<th>CONSTRUCT</th>
<th>MEAN</th>
<th>STDEV</th>
<th>RESULT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skill</td>
<td>3.13</td>
<td>.53</td>
<td>Moderate</td>
</tr>
<tr>
<td>Knowledge</td>
<td>3.38</td>
<td>.48</td>
<td>Moderate</td>
</tr>
<tr>
<td>Attitude</td>
<td>3.64</td>
<td>.79</td>
<td>Good</td>
</tr>
<tr>
<td>Learning Effectiveness</td>
<td>3.08</td>
<td>.44</td>
<td>Moderate</td>
</tr>
<tr>
<td>Long Term Learning</td>
<td>3.13</td>
<td>.59</td>
<td>Moderate</td>
</tr>
</tbody>
</table>

Observed Variables: Table 3, 4, and 5 summarize the responses to the individual survey items in descending average scores (i.e., from most positive to least positive). Table 3 shows the breakdown according to different learning goals. The low score on the items Q31, Q21, and Q34 was easily understandable (and expected): non-RE communication activities (e.g., job interviews) was something aside from the activities addressed in the exercises. The curriculum readings about elicitation techniques were thoroughly lectured, so it was not a major goal of the exercises to explain these. And later theory courses would easily be about something different than RE, thus reducing the relevance. It was more disappointing that several of the Skill questions scored comparatively low, since these corresponded to major learning goals for the exercises in question. It also came as a surprise that Knowledge questions looking at the theoretical understanding of interview and workshop as requirements elicitation techniques, and the theoretical understanding of strengths and weaknesses of various elicitation techniques, scored higher than the corresponding Skill goals. But in hindsight, and after talking to the students about this, it becomes understandable. The opinion many students had, was that to really improve their skills at performing these techniques (or selecting appropriate elicitation techniques in a given situation), many more exercises would have to be undertaken, with intensive feedback between them to allow for
gradual improvement. Hence, with one shot at doing an interview and one shot at facilitating a workshop, the major learning contribution was to increase the understanding of the respective elicitation technique beyond what could be achieved by readings and lecturing.

Table 3: Observed items, learning goals

<table>
<thead>
<tr>
<th>ITEM</th>
<th>CONSTRUCT</th>
<th>MEA</th>
<th>STD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q18: Understanding of interview as technique</td>
<td>Knowledge</td>
<td>3.93</td>
<td>.73</td>
</tr>
<tr>
<td>Q28: Importance good communication in RE</td>
<td>Attitude</td>
<td>3.93</td>
<td>.92</td>
</tr>
<tr>
<td>Q29: Importance of modeling in RE</td>
<td>Attitude</td>
<td>3.57</td>
<td>.85</td>
</tr>
<tr>
<td>Q20: Theory strengths of various techniques</td>
<td>Knowledge</td>
<td>3.50</td>
<td>.52</td>
</tr>
<tr>
<td>Q1: Overall learning</td>
<td>Short Term Learning</td>
<td>3.43</td>
<td>.52</td>
</tr>
<tr>
<td>Q30: Importance conflict-handling</td>
<td>Attitude</td>
<td>3.43</td>
<td>1.02</td>
</tr>
<tr>
<td>Q33: relevance later work-life</td>
<td>Long Term Learning</td>
<td>3.43</td>
<td>1.02</td>
</tr>
<tr>
<td>Q25: Making models from oral input</td>
<td>Skill</td>
<td>3.29</td>
<td>.73</td>
</tr>
<tr>
<td>Q32: relevance later project courses</td>
<td>Long Term Learning</td>
<td>3.29</td>
<td>.92</td>
</tr>
<tr>
<td>Q19: Understanding requirements w’shop</td>
<td>Knowledge</td>
<td>3.21</td>
<td>.80</td>
</tr>
<tr>
<td>Q23: Ability to conduct w’shop</td>
<td>Skill</td>
<td>3.14</td>
<td>.86</td>
</tr>
<tr>
<td>Q22: Ability to conduct interview</td>
<td>Skill</td>
<td>3.07</td>
<td>.73</td>
</tr>
<tr>
<td>Q24: Ability to select appropriate technique</td>
<td>Skill</td>
<td>3.00</td>
<td>.78</td>
</tr>
<tr>
<td>Q31: relevance for later theory courses</td>
<td>Long Term Learning</td>
<td>2.93</td>
<td>.73</td>
</tr>
<tr>
<td>Q21: understanding of the readings</td>
<td>Knowledge</td>
<td>2.86</td>
<td>.66</td>
</tr>
<tr>
<td>Q34: relevance for later non-RE activities</td>
<td>Long Term Learning</td>
<td>2.86</td>
<td>.77</td>
</tr>
</tbody>
</table>

Table 5 shows the breakdown on various activities, again sorted according to descending scores. The most notable observation here is that the interview activities were more highly appreciated for their learning effects than the workshop activities, the only exception being the half hour that each student had to role-play as customer in an interview (while many found this fun, they did not think it had much of a learning effect). In particular, the half hour when each student had to be scribe in the workshop was not considered very interesting. There may be several reasons for this:

- The written instructions for how to conduct the workshop mainly focussed on the facilitator’s role, not so much on the scribe.

- The scribe’s performance was not made a focus of separate evaluation. One possibility might have been to capture the workshop on video and in retrospect look at the notes of the scribe to see if there was important points that had been poorly captured – this was not done.

The popularity of the workshop may also have suffered somewhat from the fact that interviews were conducted first, the information elicited from these then used to make a draft specification which was further elaborated in the workshop. Hence, the amount of fresh information elicited would normally have been bigger in the interviews (and the
students may – correctly or incorrectly – have had a perceived correlation between learning about the customer case and learning about RE). Hence, the results might have been somewhat different if workshops had started off from a clean sheet situation.

Table 4: Item responses, activities

<table>
<thead>
<tr>
<th>ITEM</th>
<th>ACTIVITY</th>
<th>MEA</th>
<th>STD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q4: Learning from conducting interview</td>
<td>Interview</td>
<td>3.71</td>
<td>.61</td>
</tr>
<tr>
<td>Q3: Learning from reading instructions</td>
<td>Other</td>
<td>3.50</td>
<td>1.23</td>
</tr>
<tr>
<td>Q6: Learning from observing interviews</td>
<td>Interview</td>
<td>3.43</td>
<td>.76</td>
</tr>
<tr>
<td>Q7: Learning from facilitating w’shop</td>
<td>Workshop</td>
<td>3.39</td>
<td>1.17</td>
</tr>
<tr>
<td>Q2: Learning from preparing case</td>
<td>Other</td>
<td>3.14</td>
<td>.77</td>
</tr>
<tr>
<td>Q9: Learning from observing w’shop</td>
<td>Workshop</td>
<td>2.92</td>
<td>1.07</td>
</tr>
<tr>
<td>Q10: Learning from writing final report</td>
<td>Other</td>
<td>2.86</td>
<td>.54</td>
</tr>
<tr>
<td>Q5: Learning from playing customer</td>
<td>Interview</td>
<td>2.71</td>
<td>.73</td>
</tr>
<tr>
<td>Q8: Learning from being scribe at w’shop</td>
<td>Workshop</td>
<td>2.31</td>
<td>.95</td>
</tr>
</tbody>
</table>

Table 5 shows the scores for the three questions Q17, Q26, Q27, for which the “zero” score is 3, as 1 and 2 constitute negative options, for instance that the peer review exercises reduced the enjoyment of the course (Q27). All these three variables end up on the positive side, i.e., significantly above 3. The high score on relative learning effectiveness is particularly encouraging, the question here being whether or not the learning was achieved more effectively by the chosen teaching technique (i.e., oral exercises) than what could have been achieved by others techniques. None of the respondents thought the chosen teaching technique was less effective (response = 1 or 2), and only 3/14 respondents felt that it was equally effective as other techniques (response = 3). The remaining 11 respondents felt that it was more or much more effective (response = 4 or 5). This indicates that the oral communication exercises were certainly worth the time spent. The fact that Q26 scores lower than Q27 can perhaps be explained by the fact that the course is elective, hence the students were already motivated for it from the outset.

Table 5: Other observed items

<table>
<thead>
<tr>
<th>ITEM</th>
<th>MEA</th>
<th>STD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q17: Relative learning effectiveness</td>
<td>4.07</td>
<td>.73</td>
</tr>
<tr>
<td>Q27: Enjoyment of the course</td>
<td>4.07</td>
<td>.48</td>
</tr>
<tr>
<td>Q26: Motivation for the course</td>
<td>3.86</td>
<td>.77</td>
</tr>
</tbody>
</table>

Time spent: The questionnaire also included six questions on the time spent for the various activities included in the exercises. The time to be spent on the oral interview and workshop activities, as well as observing these activities, were standardized by teaching staff guidelines (e.g., 30 minutes per interview), but still there was some slight variation, some students spending only 20 minutes on their interview, and one student
spending 50 minutes. The biggest variations in time spent were found for the background activities, such as preparing the case for customer role play, making the draft specification after interviews, and writing up the final report after the workshop. One discouraging finding was a negative correlation (-0.55) between the total time spent on the exercises and the perceived overall learning effect, i.e., the students who spent most time on the exercises were among the least convinced about the learning effect. The explanation for this is uncertain, but one suggestion might be that the groups these students were involved in, worked inefficiently – perhaps also with an uneven distribution of the workload among the group members, which will normally be discouraging to those who put in the most effort. Also, much of the extra time would have been associated with the final report, which was anyway not considered the activity where most of the learning occurred (cf. Table 4).

**Process Improvement:** The questionnaire also included 6 questions investigating possibilities for improving the elicitation exercises for the next offering of the course. Among these, Q37-Q39 were concerned with specific changes taking place in the study programme (moving the course from Spring to Autumn, introducing new grading practices), and these are not so interesting for general discussion. Q35 asked for potential reasons why the exercises had not functioned optimally, suggesting some factors and leaving an open “Other”-field for the students to suggest reasons other than those mentioned. No students used the “Other”-field. The most recognized factors were (on a scale where 0 meant “not a factor” up till 5=“very important factor”): “thin feedback from staff”: 3.8, “information from staff came too late”: 3.0, “tasks were too time-consuming”: 2.9. Other suggested factors (“unserious actors”, “poor role-play”, “unclear info from staff”, “thin business cases”, “tasks were boring”) were less evident, averaging around or below 2.0. Hence, the feared problem that the students would not be able to make realistic business cases and role-play faithfully as customers did not come true, and there are easy targets for improvement by the staff. Information did indeed come late at some points, e.g., instructions on how to conduct interviews and workshops were being written just in time for the exercises to take place. For new offerings of the course, this would be easier, the material already in place and only needing minor updates. Similarly, some interview and workshop sessions were conducted without staff presence in the room – this might also easily be mended (except, of course, that there would be increased costs in terms of staff time) to yield more direct feedback.

Q36 asked for suggestions to improve the elicitation exercises, again with some possible suggestions explicitly mentioned. The popularity of these suggestions, on a similar scale as for Q35, were as follows:

- 3.7-3.5: “several sessions to foster gradual improvement”, “direct teaching staff feedback on oral sessions”
- 3.4-3.2: “show video tapes of experienced analysts performing interviews and workshops”, “staff give practical illustrations of do’s and don’t’s”, “stronger staff QA of business cases”
- 2.5, 2.0: “more lectures on elicitation techniques”, “more readings on elicitation techniques”

The least popular suggestions were more lectures and readings, further indicating that the students preferred the oral exercises over more traditional teaching techniques for the topics in question.
Threats to validity:
The response rate of only 44% for the questionnaire is a considerable threat to validity, as recommendations say that one should have response from at least two-thirds of the class to be sure to have a representative sample [16]. Yet, talking to students in retrospect, it is our impression that they were generally positive about the exercises, whether they answered the questionnaire or not. So, it seems unlikely that there is a “silent majority” with a much more negative view.

Another threat is that the students might be unable to evaluate how much they have learnt, and it is a clear weakness that the evaluation is only based on student perceptions, not on measurements of improved performance. Indeed, the students might have valued the exercises for being different from those of other courses, rather than for being good. Still, literature indicates that student ratings of teaching tend to be valid and positively correlated with evaluations by peers and alumni [16].

Finally, our experiences are based on one offering of one course, with a quite uniform group of students (all Norwegians, aged 22-25, with a similar undergraduate education). Hence, there is no guarantee that results might not be different if similar approaches are tried out in different settings.

5. Summary and conclusions

The teaching approach reported in this paper is similar to what takes place in several other universities, in that role-play is used to exercise oral elicitation techniques in RE. Yet, it is also different from other approaches we are familiar with:

- Students role-play both as customers and analysts, and – unlike [10] – both roles are done by students taking the same course, so that each student has to pose as both customer and analyst in different sessions.
- The case descriptions of fictitious organizations are developed by the students themselves, not provided by staff.

The message of this paper is not that the approach chosen here is better than other approaches. Indeed, other approaches offer several advantages, for instance in terms of realism and motivation (real customer) or teacher control over exactly what is learnt (teacher-student role-play, teacher-developed cases). Moreover, providing the same teacher-developed case description to all students will have advantages for assessment (possibility to easily compare the outcomes of various elicitation efforts afterwards).

What this paper has shown, though, is that student-student role-play over student-developed cases is a viable approach to practicing oral elicitation techniques with subsequent modeling of the elicited information. While having some weaknesses compared to other approaches, our chosen approach also has advantages: 1) Teaching staff is relieved from the burden of developing cases. Since case development is something the students can also learn from (e.g., having to provide information models and process models for the fictitious company), it is not a “wasted” activity. By insisting that each student team choose a different kind of company, one also avoids the problem of copied solutions. 2) Teaching staff is also relieved from the burden of role-playing as customers, which makes it much easier to scale up to large classes.

Based on the experiences from Spring 2004 it was decided to continue this type of exercises for the next offering of the course (Autumn 2004), but the data from that run were not fully analyzed at the time of writing.

References


**Appendix A. Questionnaire (English translation)**

**LEARNING EFFECTS OF ELICITATION EXERCISES**

Practical exercises in oral requirements elicitation techniques (interviews, requirements workshops) were introduced in TDT 4250 this year, so we wish to evaluate this teaching technique to find out whether it gave a useful learning experience. We are also interested in suggestions for improvement for the benefit of next year’s students. **THERE ARE NO RIGHT OR WRONG ANSWERS TO THE QUESTIONS BELOW, AND YOUR ANSWERS WILL HAVE NO CONSEQUENCES FOR THE GRADING IN THE COURSE – PLEASE JUST GIVE YOUR HONEST OPINIONS.**

The form shall be delivered INDIVIDUALLY, but together with the final report about the elicitation exercises, **due 2 April.** I.e., the report of a group with 4 members should be accompanied by 4 filled in copies of this form. While you collaborate on the report, please do not do so when filling the form, as we are interested in each personal opinion – to improve the course as much as possible. There will be another evaluation form at the end of the course (evaluating lectures, reading materials, the full range of exercises, etc.) so in this form, you do not need to comment on anything which is not related to the elicitation exercises.

**PART 1. OVERALL LEARNING**

**Q1. How much did the elicitation exercises (all together) contribute to your learning in this course?**

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**Q2. Did you learn something from preparing the business case?**

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Did not perform this activity

**Q3. Did you learn something from reading the instructions about how to perform an interview and requirements workshop?**

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**Q4. Did you learn something from interviewing a ‘customer’?**

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**Q5. Did you learn something from playing customer in interview and requirements workshop?**

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**Q6. Did you learn something from observing and evaluating interview performances?**

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**Q7. Did you learn something from facilitating a requirements workshop?**

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Did not perform this activity

**Q8. Did you learn something from being scribe at the workshop?**

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Did not perform this activity

**Q9. Did you learn something from observing and evaluating the facilitator’s performance?**

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Did not perform this activity
Q10. Did you learn something from writing the final report about these exercises?

☐  ☐  ☐  ☐  ☐  ☐  Did not perform this activity

Nothing  A little  Medium  Much  Very much

PART II: TIME SPENT AND RELATIVE EFFECTIVENESS

Q11. How much time did you spend preparing the business case before the interviews?

APPROX. NUMBER OF HOURS: _______

Q12. How much time did you spend performing your interview (stipulated time was 30 min.)?

APPROX. NUMBER OF MINUTES: _______

Q13. How much time did you spend being interviewed + observing and evaluating interviews (stipulated time was 2 hours + maybe some extra time for finishing the feedback to the interviewers)?

APPROX. NUMBER OF HOURS: _______

Q14. How much time did you spend developing the draft requirements specification after the interviews (but before the workshop)?

APPROX. NUMBER OF HOURS: _______

Q15. How much time did you spend on requirements workshops? (stipulated time was 4 hours, i.e., 2+2)

APPROX. NUMBER OF HOURS: _______

Q16. How much time did you spend writing up the final report?

APPROX. NUMBER OF HOURS: _______

Q17. How effective was the learning from the elicitation exercises compared to learning the same through more lectures, textbook reading or written exercises?

“Learning through the oral activities was…”

☐  ☐  ☐  ☐  ☐  ☐

Clearly  Less  Equally  More  Clearly

less eff.  effect.  effective  effect.  more effective

PART III: KNOWLEDGE

Q18. How much did the elicitation exercises contribute to your theoretical understanding of do’s and don’t’s in interviewing?

☐  ☐  ☐  ☐  ☐  ☐

Nothing  A little  Medium  Much  Very much

Q19. How much did the elicitation exercises contribute to your theoretical understanding of do’s and don’t’s in how to conduct a requirements workshop?

☐  ☐  ☐  ☐  ☐  ☐

Nothing  A little  Medium  Much  Very much

Q20. How much did the elicitation exercises contribute to your theoretical understanding of the strengths and weaknesses of interviews and workshops as elicitation techniques?

☐  ☐  ☐  ☐  ☐  ☐

Nothing  A little  Medium  Much  Very much

Q21. How much did the elicitation exercises contribute to improving your understanding of the compendium papers (in particular, those that dealt with comparing different elicitation techniques)?

☐  ☐  ☐  ☐  ☐  ☐
PART III: SKILLS

Q22. How much did the elicitation exercises contribute to your ability to conduct a requirements interview?

Nothing  A little  Medium  Much  Very much

Q23. How much did the elicitation exercises contribute to your ability to conduct a requirements workshop?

Nothing  A little  Medium  Much  Very much

Q24. How much did the elicitation exercises contribute to your ability to select an appropriate elicitation technique according to the situation at hand?

Nothing  A little  Medium  Much  Very much

Q25. How much did the elicitation exercises contribute to your ability to make models and specifications based on oral input?

Nothing  A little  Medium  Much  Very much

PART IV: ATTITUDE

Q26. How did the elicitation exercises affect your motivation for the course?

Strongly demotiv.  Slightly No effect  Slightly Very motiv.  motivating

Q27. What effect did the elicitation exercises have on your enjoyment of the course?

Strongly negative  Slightly No effect  Slightly Very positive  positive

Q28. Did the review exercises contribute to your understanding of the importance of communicating well with customers and users in IS development?

Nothing  A little  Medium  Much  Very much

Q29. Did the review exercises contribute to your understanding of the importance of conceptual modelling in IS development?

Nothing  A little  Medium  Much  Very much

Q30. Did the review exercises contribute to your understanding of the importance of handling conflicts between stakeholders in IS development?

Nothing  A little  Medium  Much  Very much

PART V: LONG TERM LEARNING

Q31. Do you think the elicitation activities have made you better prepared for later theory courses?

Nothing  A little  Medium  Much  Very much
Q32. Do you think the elicitation activities have made you better prepared for later project courses (and diploma work)?

Nothing  A little  Medium  Much  Very much

Q33. Do you think the elicitation exercises have made you better for later work-life (e.g., as a requirements analyst)?

Nothing  A little  Medium  Much  Very much

Q34. Do you think the elicitation exercises have made you more confident at dealing with other work-related communicative situation, e.g., job interviews?

Nothing  A little  Medium  Much  Very much

PART VI: THE PROCESS AND POSSIBLE IMPROVEMENTS

Q35. In cases where the elicitation exercises did not function optimally, what were the reasons? (Give points from 0 = ‘no reason’ and up to 5 = ‘extremely important reason’)

☐ information from teaching staff came too late
☐ information from teaching staff was unclear
☐ feedback from staff on the delivered parts of the exercises was too thin
☐ business cases were too poorly prepared
☐ role-play was not good enough
☐ the tasks were not taken seriously
☐ the tasks were too time-consuming
☐ the tasks were boring
☐ other reasons – Please specify:

Q36. To learn more from the exercises, you think it would have been a good idea to… (Give points from 0 = ‘NOT a good idea’ and up to 5 = ‘a brilliant idea’)

☐ do several interview sessions and facilitation sessions, with the possibility for gradual improvement
☐ have direct teaching staff feedback on the oral performances
☐ get practical illustrations of do’s and don’t’s by teaching staff before undertaking the exercises
☐ include more lectures about elicitation techniques
☐ include more papers / book chapters about elicitation techniques
☐ show video tapes of experienced requirements engineers performing interviews and workshops
have a stronger quality assurance of the business cases produced before the interviews

other ideas – Please specify:

__________________________________________________________

Q37. Next year, this course will be moved to the autumn term, parallel with TDT4290 Customer-Driven Project. Would it then be a good idea to teach elicitation techniques at the very start, so that the students could make active use of their learning also in the project?

☐ YES ☐ NO

Q38. Next year, 40% of the grade in this course will be based on exercises. Which parts of the elicitation exercises might contribute to the grade? (Give points from 0 = ‘totally inappropriate’ and up to 5 = ‘very appropriate’)

☐ the prepared business case (written)
☐ the interviewer performance (oral)
☐ the draft specification made after interviews (written)
☐ the facilitator performance (oral)
☐ the final report (written)

Q39. Would grading of oral performances be more OK if there were several (ungraded) training sessions first?

☐ YES ☐ NO

Q40. Do you have any other comments or suggestions as to how the elicitation exercises can be improved?

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### Appendix B: Response data

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