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A SYSTEMATIC SELF-ASSESSMENT TOOL

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ABSTRACT
The Bologna Process has led to fundamental changes in the way students are taught. This in turn has led to new quality assurance systems for teaching. For good outcomes to occur both the teachers and students need to be aware of the intended learning outcome (ILO) and this is made clearer by well defined Teacher/Learner Activities (TLAs). The Systematic Grading Procedure (SGP) has been shown to assist teachers grading student's 3D-image work, fulfilling a need for assistance in subjects requiring grading of subjective nature. With the application of this method have both teachers and students been given a tool that helps them better understand the grading process and the level of importance of different parts of the 3D work. The aim of this study was to assess students' learning outcomes. The SGP was used and compared by both teachers and students in assessing their own work. This study used four students who were introduced to the SGP at the introduction of the course. This was done to give then an idea how they are to understand the ILOs. After one of their assignments was graded the students were given an opportunity to improve their work using the SPG. Three of the four choose to improve their work. The ensuing interview and results showed that the SGP could be used as a tool to help students and teachers with the ILO and TLAs. In addition to that the SGP should further be tested for verification.

Keywords: Assessing 3D-art, subjective values, systematic grading procedure, systematic self-assessment tool

1 INTRODUCTION

The Bologna Process has led to 47 countries adapting to and fundamentally changing their teaching methods to outcome based learning methods with quality assurance systems [1]. This in many ways has required teachers to develop measurement systems that can both accurately measure the students' progress while helping them learn. The backside of this is that students are not always motivated or they lose motivation due to unclear and improperly designed tasks. This is especially true for courses requiring subjective grading methods, e.g. 3D imaging. As stated in Biggs and Tang [2] (p. 39) "teachers create a learning climate through formal and informal interactions with students, which establishes how we and our students feel about learning". To help understand this concept of good teaching the concept of scholarship in teaching was introduced [3]. This means that one keeps up to date knowledge about teaching and apply that knowledge to ones own teaching. Two important ways of improving teaching are to, firstly, encourage good teaching and assessment across whole institutions, and, secondly, shift the focus from the teacher to the learner, which means, to clarify what learning outcomes students are meant to achieve [2], thus, the outcomes are important for good teaching. Six clusters of goals were identified by Angelo and Cross [4] for outcome-based teaching: (1) higher order thinking skills, (2) basic academic success skills, (3) discipline-specific knowledge skills, (4) liberal arts and academic values, (5) work and career development and (6) personal development. The clusters show the different ways and levels people learn, although, the best way to teach students is to use problem-based learning because reflects the way people learn in real life [2].

For good outcomes to occur in teaching, both the students and teachers need to have a clear understanding of what the intended outcomes of learning are. This means that students are to feel the need to achieve a specific outcome, feel free to focus on the task and that students can work collaboratively, while with

keeping a dialogue with others. By having a consistent system that relates to the real life, students will be engulfed by a consistent system that supports them to engage in appropriate learning activities. In places where this positive learning environment is not found will one will find out that students are not learning as much as they are capable of. In many cases, if not the most, will they only learn what is required of them so that they can perform well on a test. When the teaching/learning activities are clearly laid out, the students can clearly understand not only why but also how to complete their tasks. And therefore it is important that the "assessment strategies allow for unexpected or unintended outcomes" [2] (p. 11).
Biggs & Tang [5] show how outcome-based teaching and learning works and ask some questions that all teachers and examiners should question themselves before planning a course: "What do I intend my students to be able to do after my teaching that they couldn't do before, and to what standard? How do I supply learning activities that will help them achieve those outcomes? How do I assess them to see how well they have achieved them?" To clarify what learning is rewarded and also guide students' in an effective approach to study well-designed and well-planned assessments are a strategic tool [6]. Then it is important that the Intended Learning Output (ILO) has been communicated to the students [2]. To clarify what the students in 3D graphics courses are taught at the division of Innovation and Design at LTU and what is expected of them, the assessment criteria was communicated to them. However the examiners have over the years seen that the students give priority to model highly detailed objects and environments, but often forget the visualization part. Lighting and shadows are most often neglected and a possible reason for this may be unclear or insufficient communication of the ILOs.
Another problem with courses in 3D-graphics is that assessment of students work is largely based on subjective values. Ponn et al. [7] found that a standardized method for systematic grading is to be preferred, because it facilitates the grading process for new teachers and helps the students better understand the 3D-graphics process. To assist in making it easier to grade students and give feedback the Systematic Grading Procedure (SGP) showed to be a reliable tool to assess and grade student work, even with consistency [11]. As was shown the validity of grades increased, when the examiner showed how grades were determined by specific criterion and then weighed on a scale to produce a final cumulative grade. In an experiment Berglund and Tretten [8] also found that the SGP facilitates the assessment process for less experienced teachers.
It has been argued that the design problems students' faces are complex and that there are no fail-safe methods for assessing design and technology students [9]. The same applies when it comes to communicating ILO, when the assessment is largely based on subjective values. The more students there are in a class the less time each student gets for guidance. Then a systematic self-assessment tool might be useful. Students could then evaluate their own knowledge and thus become aware of any deficiencies. Elisabeth Ahlstrand [10] shows how necessary it is that, both the students and the teachers should have the same frame of reference to what level the work was assessed, so students know in advance what is expected of them and how the student work will be assessed to ensure high reliability for subjective assessments. This assists them in the ILO and more specifically teaching/learning activities. To assist in this the SGP [11] was developed to help teachers in assessing and grading student work of subjective nature, with a higher consistency and as an excellent tool for feedback [11]. What needs to be further evaluated is that if the SGP can be a learning tool for both the students and the teachers in 3D-imaging courses. In this paper an exploratory study, using the SGP, was used as a teaching tool in assisting students in learning and understanding 3D-graphics work. The aim of this study was twofold, first, it was used to assess students' learning outcomes and, secondly, to further study the SGP as a method for grading course work of subjective nature.

2 METHOD

To test the experiment design a pilot study was performed. The purpose is to conduct a full scale study with up to 100 participants and therefore the experiment design is crucial, so in order not to waste too much resources and effort the study was done with a small group of students. Four students used the SGP in order to assess and grade their own 3D images from an assignment in the course Computer Aided Industrial Design. Only one image per student was assessed. The course had only one assignment where the students handed in one image. The assignment is to create a still life using a 3D software. The

assignment comes with quantitative criteria like "there should be at least a bottle, two glasses, a bowl of fruits and an environment", and qualitative criteria like "glass materials should give a realistic impression, the image should have a harmonic composition". For self-assessment the students used SGP, which is the same assessment method as the teachers use in the course.
The SGP is a model in which the student's task is assessed in a number of assessment areas, such as *modelling, lighting and materials*. Each assessment area is broken down into grading criteria. The criteria for the assessment area *Lighting* can be lights and shadows and the criteria can be given different weights depending on the purpose of the task, e.g. *modelling* can be 50%, *lighting* 25% and *materials* 25% of the assignment grade. The SGP method breaks down the grading procedure into smaller and more specific parts. The goal is to use more objective specifics without removing from them the overall subjective assessment of the 3D images. For the assignment used in the study, four assessment areas were used: *Modelling, Lighting, Materials and Composition*.

Table 1. Example of the SGP template used in the study, filled in with random values to exemplify the use of and weighting of the final assignment grade

Modelling 25%	
Modelling (Grade 0%-100%)	85
Assessment area grade	**85**
Lighting 25%	
Light (Grade 0%-100%)	80
Shadows (Grade 0%-100%)	85
Assessment area grade	**82,5**
Material 25%	
Material feeling (Grade 0%-100%)	85
Texturing (Grade 0%-100%)	70
Assessment area grade	**77,5**
Composition 25%	
The image composition (Grade 0%-100%)	95
Assessment area grade	**95**
The final image grade	**85,0**

First the students were given a review of the SGP, where examiners graded a dummy image, just to show how the SGP is used. Then, the students used the SGP to grade their own image. This was done with the aim that the students would become better aware of the teaching/learning activities (TLAs). After their exposure to the SGP the students were given a chance to improve their work. The students were given three weeks to make any changes in their images and make a final submission, which were assessed by the teachers. In the first part two experienced teachers used the SGP to assess and grade the same images as the students. In the second part the same teachers used the SGP to assess and grade the student's images from the last submission, without knowing whether the images had been adjusted a second time. The differences between the examiners two assessments were then evaluated to detect any discrepancies in grading between the first and second submission. The difference between the examiners and the students' scores from the first test part was also evaluated. An interview was also conducted with the students. The questions used in the survey were:
After the use of SGP did you make any change in your image, in order to improve it?
If Yes, what changes did you make?
If No, why did you not make any changes?
If you for some reason was unable to make changes, such as lack of time, had you made changes if you would have the opportunity to do so?

Have the course objectives become clearer after using SGP?
Have your understanding of the grading process increased after using the SGP?

Figure 1. Example of students' two images from the first part to the left and from the second part to the right

3 RESULTS & DISCUSSION

The results (Table 1) show the score that each image got from the first assessment (Part 1) and the second assessment (Part 2), after the students were given the opportunity to improve their images. Student 1 did not take the opportunity to improve the image and the difference between Part 1 and Part 2 and student 3 only made minor changes. Student 3's picture showed such a high quality that these small changes had no affect at all on the score in Part 2. Student's 2 and 4 made the most extensive changes in their work and also had the greatest difference in scores between Part 1 and Part 2. The grades the students gave their own images was on average 6.7% (0.5% - 11.3%) lower than the grades from the teachers assessment of the same images. The ensuing interview showed that Student 1 was not able to make any changes due to lack of time. The question of whether the course objectives become clearer gave no unequivocal answers. Although all the students felt that the understanding of the grading process and that the students TLA increased after use of the SGP. Even though this result was not quantified it became relevant in the following interviews. The students made changes that improved the images visual details of their work and were able to express a better understanding of the task involved. As according to Biggs and Tang [2] the most important result is how to shift the focus from the teacher to the learner, which means, to clarify what learning outcomes students are meant to achieve. The results of the study showed that the experimental layout work, which means that a larger study will be performed. Provided that positive results are obtained from the large-scale study, the SGP self-assessment procedure will be implemented as a permanent element in the course.

Table 2. The result from the two-part experiment

Student	**Part 1**	**Part 2**		**Any changes made after the first assessment**
1	76,3	77,5	1,3	No changes made to the work
2	81,3	85,0	3,8	Changed lighting and some minor material adjustments
3	91,3	91,3	0,0	Minor changes
4	72,5	77,5	5,0	Changed lighting, shadows and composition of the objects

4 CONCLUSIONS

The results indicate that SGP could work as a tool for gaining a better understanding of overall learning outcomes and the teacher/learner activities. The students who adjusted their images after using the SGP received a higher score, and they showed a better understanding of how 3D-imaging could be used to gain more realistic images. However, a full experiment needs to be carried out in order to verify this pilot study. Although this study hinted on the possibility to use the SGP as a self-assessment tool. An immeasurable effect of the SGP is that when the students were presented with the TLAs they may have been motivated to produce a good product. This may also explain the reason why all performed so well already from the beginning.

The grade given by the students to themselves while using the SGP were all lower than the scores set by the examiners and it is interesting to see that the students considered their pictures as of poorer quality than the examiners did. A possible reason may be the lack of experience to assess 3D generated images. However this is something that the authors find interesting and worth further research.

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