Incremental Grading - An Example of Using Hybrid Pedagogy as Guideline for Assessment Design

Christian Köppe[1][0000−0003−0326−678X] and Rody Middelkoop[2]

[1] Utrecht University, Utrecht, Netherlands
c.koppe@uu.nl
[2] HAN University of Applied Sciences, Arnhem/Nijmegen, Netherlands
rody.middelkoop@han.nl

Abstract. Assessments are essential elements in higher education, but their design often seems to be guided by standard approaches and some impeding phenomena persist. Addressing such phenomena—e.g. procrastination, low self-assessment skills, low ownership of learning—is often done through design-based research (DBR). Finding new design solutions (or interventions) which can be evaluated for their successful applicability is an essential element of DBR. Using hybrid pedagogy—the conscious intermingling of prevalent dichotomies in educational design—as guideline for (re-)designing such assessment approach elements can open up new solution spaces and opportunities to address some of the existing challenges.
In this work we describe how hybrid pedagogy was used as guideline during assessment development for a semester on software engineering. We present how this broadened the solution space and how it impacted some design decisions. The result of this assessment development is an approach termed Incremental Grading, which is based on a re-configuration of well-known and proven good practices.

Keywords: Incremental Grading · assessment design · hybrid pedagogy.

1 Introduction

Assessments—both formative and summative—form an essential element in higher education: they provide insight in the outcome of student learning, offer opportunities for feedback and check whether learning goals have been met. When designing a unit of learning such as a course or a semester, it seems that instructors tend to follow some well-known paths when it comes to assessments: besides assessment types such as written exams or obligatory tests, there often are one or more larger assignments which are handed in at the end of the course and where on certain moments feedback is given on, based on the student's current work status. While this is an established approach, we still can observe some of these phenomena:

- Students often seem unsure about the quality of their final work or have a rough feeling about the quality but are unable to predict the grade. Therefore these grades often come as surprise, either being lower or higher than expected which might result in decreasing confidence in a fair grading system.
- Feedback which is given by teachers is not always experienced as valuable by students, as it is mainly for looking back and not forward. This changes when the feedback is directly relevant for getting a higher grade, even though the focus should be mainly on the quality of the work and not the grade.
- The examples and exercises used in courses are often superficial and not very realistic. Even when real contexts are used, they often do not align with the student's environment or interests, therefore being less relevant and less motivating for them.
- In many cases there are some fixed assessment moments: besides at the end of a course there often are other moments earlier in the trajectory where an assessment is done. In many cases, these assessments result in low grades because they are a snapshot in time, looking at work at progress. Such fixed assessment moments are mostly dictated by planning issues and not intended as milestones, related to quality aspects. Many teachers use this approach for showing the students that they need to work harder and deliver better quality, hereby hoping that this motivates the students. But even though it might become obvious to students where their shortcomings are, the grade is given and usually can't be improved. This is unnecessarily frustrating, especially if the students actually are able to deliver much better quality, just not at this snapshot moment. It seems that in that case the assessment is somehow disconnected from the desired learning outcomes.

Our hypothesis is that some of these phenomena might remain because we as educational designers regularly seem to be stuck with thinking in dichotomies. In some cases we explicitly make a choice between one of the two dimensions, e.g. we either give synchronous feedback during a face-2-face session or a working group *or* we give asynchronous feedback, usually some time after students have handed in some work. Another example is that we also often choose for either online lectures *or* classroom lectures.

In other cases, when there is a dichotomy we as teachers ignore one side of it and without questioning apply the usual suspect. This is the e.g. the case when looking at the responsibility for determining the final grade for some student's work. Most teachers would not dare to argue that this responsibility lies anywhere else than by themselves, fearing loss of control on the quality of the work or grade inflation due to student's over-assessment. Having students seriously grading their own work is therefore rarely applied, even though if doen well most authors report various positive effects of self-grading such as quicker and more detailed feedback for students, deeper understanding of the topic, and greater awareness of own strengths, progress, and gaps [3, 4, 9].

Design-based research is a proven approach to develop solutions (or interventions) for solving common problems in education. One important element of

this research method is to find potential solutions that address the problems appropriately. This is usually done by exploring the solution space, the collection of all principally applicable interventions, initially often without concrete knowledge of their effectiveness. Out of these potential interventions the most promising ones are chosen and applied, their effects evaluated and if necessary iteratively adapted or improved. However, exploring such solution space is often subject to relying on previous knowledge, which is also the case in assessment design as described above.

We believe that the concept of Hybrid Pedagogy, or *hybridity* in general, offers new possibilities for expanding the solution space. Exploring such new (and yet unused) space between known dichotomies is at the core of this concept and also a key tenet in design thinking. Rorabaugh and Stommel describe hybridity as follows:

> "[...] hybridity suggests hesitation at a threshold. Hybridity is not an attempt to neatly bridge the gap, but extends the moment of hesitation and thereby confuses easy categorization. And, as we allow two things to rub against each other, two things that might not otherwise touch, we invite them to interact, allowing synthesis (and even perforation) along their boundaries. As the digital and analog—the physical and virtual—commingle, we must let go of the containers for learning to which we've grown accustomed. We must open to random acts of pedagogy—to connections that are, like the web, associative and lively but sometimes violent and deformed. In this, hybridity is not always safe, moving incessantly (and dangerously) toward something new—something as yet undetermined." [8]

Applying hybridity as guideline for design widens the solution space. In the first example in Figure 1, this means that feedback does not have to be either synchronous or asynchronous, but that it also could be asynchronous in such a timely manner that it feels more synchronous (and also has the benefits of synchronous feedback).

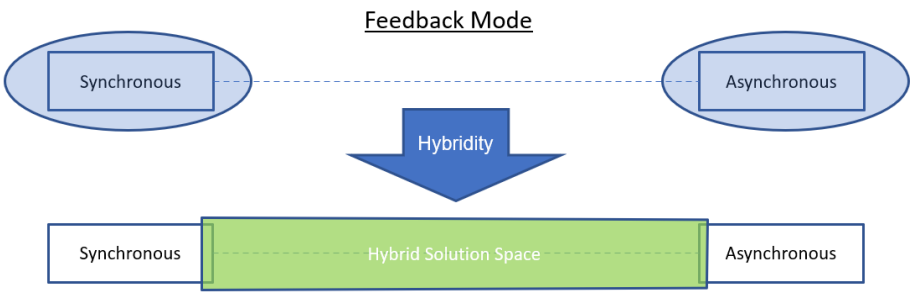

Fig. 1. Explicit exploration of unused solution spaces (in green) which are neither clearly synchronous or asynchronous

In the second example in Figure 2, the unused solution space suggests to share the responsibility of determining the grades with the students. This could be done by sharing the responsibility with them (in various degrees) or even by completely moving it to the students (as applied in self-grading).

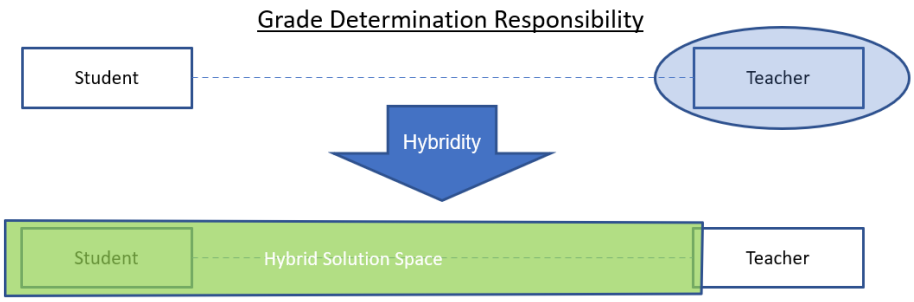

Fig. 2. Explicit exploration of unused solution spaces (in green) towards students being responsible

Questioning the well-known paths and exploring the space that opens when intermingling dichotomies leads to new opportunities. This also comprises the arise of challenges which need to be addressed. In that case, well-known educational design patterns or good practices in general might help with finding (partial) solutions to these challenges. However, the real power of educational patterns lies in combining them to larger scenarios. Such combinations might lead to solutions or interventions that actually fall into the previously unused solution spaces, so consciously looking for these can be an important and promising aspect of assessment design. Additionally, in some cases it might be valuable to explore the applicability of educational patterns in broader or different contexts than the ones described in the patterns themselves.

In our case, applying educational design patterns as solution heuristics and hybridity as guideline to address arisen challenges led to the approach of Incremental Grading, which is described as pattern language in [7] and summarized in Section 4 in this work.

In the next section we will shortly describe the process which was applied for designing the assessment elements of the semester, This is followed by three detailed examples of how hybridity was used as guideline and how this helped to design elements which address some of the aforementioned phenomena. The paper concludes with a summary and outlook on future work.

2 Assessment-Driven Course Design

The applied design process for the semester on software engineering at HAN University of Applied Sciences followed the approach of assessment-driven course

design as described in [1]. We started with the course objectives and the accompanying assessment criteria. Various assessment forms were selected such as written exams, reading tests, online quizzes, a learning journal, and a larger case study. For most of these assessments rubrics were developed. When starting to define the details of the assessments, such as planning, content etc., we consciously explored further possibilities than the ones we were used to apply in this semester in order to address the aforementioned phenomena. We hereby looked at existing educational design patterns, even when their contexts initially did not seem to be completely fitting with our context. We also tried to realize when we were stuck in dichotomy thinking and explored the previously unused hybrid solution space.

One example is the content of the case study. The more easy approach is to define the topic/problem/technology and have all students work on this same issue. Advantage of this approach is that all solutions and student work products are more comparable and some more detailed performance sheets can be used for grading the students' work. However, as mentioned earlier, such given topics have a high chance of not being very motivating for the students. Furthermore, such solutions are of only little relevance for the students and it is quite frustrating that the solution after being graded usually is extinguished. This is especially true for the group of students we had, as they studied in part-time and all worked in companies where they likely already applied—or where able to apply—the same concepts as the ones required for the case study. For that reason we decided to apply Bring Your Own Assignment [5], a design pattern of the pattern language for hybrid pedagogy. Requirement was that the assignment they bring covered all aspects which also were part of the assessment criteria. Besides that the students were free to choose the technology and domain of their case study. Even though this is likely more motivating and relevant, it also makes it harder for teachers to provide appropriate feedback and likely increases the time needed for grading the work products, because technologies and domains might have been used by the students which the teachers are not completely familiar with.

When looking for how to solve this and other issues, hybridity helped us as guideline for finding potential solutions that addressed the newly created problems and questions as well as the initially identified phenomena. In the next section some examples are provided of how this guideline led to various design decisions and hybrid elements in the assessment design.

3 Interacting Dichotomies in Assessment and Education

Example 1: Fixed assessment moments — continuous assessment ***and*** *Student responsibility for determining grade — teacher responsibility*
The first idea during designing the semester was to define some of fixed assessment moments. But when putting our hybridity glasses on, the option came up that assessments can take place whenever students think they've achieved some certain quality levels for (parts of) their work. This idea was also triggered by

the usage of learning outcomes and the fact that some of the students already created some products, e.g. at their professional work, which could serve as evidence that they already achieved the learning outcomes. So we interchanged the snapshot moments with student-defined milestones. As the professional work the students did (these were part-time students) was very diverse and it might have cost a lot of time to relate the learning outcomes to the various products they hand in, we decided that it should be the responsibility of the student to prove that he or she has achieved the learning outcomes. To make sure that this self-grading is done appropriately, we added the requirement that not only a grade (based on rubrics) has to be requested, but that also a sufficient justification has to be added in order to show that the quality of the work is in accordance with the rubric quality level and associated grade.

Initially only intended for students who wanted to use existing products from their workplace, we decided to apply this approach for all students, also the ones who followed the standard learning path of the course. This resulted in student-driven grading where the students themselves decide when they want to hand in some (partial) work and request the matching grade in a grading request. Still, the teachers eventually determined if the requested grades were accepted or not, but it was the responsibility of the students to determine and justify the grade. This way, the assessments became more continuous and the students' responsibility had increased, potentially leading to the desired effect of improved self-assessment skills and higher ownership of learning.

Example 2: Grading — Feedback
As teachers we often either give feedback only—intended for supporting learning and improvement—or we provide a grade with some justification, usually after some work has been finished. Both are valuable but have some shortcomings: even though feedback helps the students to know where they stand, they are dependent on the teacher to provide them with this information. This feedback is also often experienced as todo-list by the students, potentially resulting in the effect that elements of their work where no specific feedback is given on are seen as good enough. Furthermore, the feedback which is valued most by students is which parts already are good enough for getting a sufficient grade. This kind of feedback does not trigger a growth mindset as they likely won't do more work on parts which are already of sufficient quality. It furthermore keeps the students reactive.

On the other hand, grades which are given after some work has been finished are only used for looking back. Even though when they come with feedback, this feedback is based on work which is done and likely not directly applicable for other assignments (and therefore also not experienced as very relevant by the students). These two dimensions—the moment of grading, usually after some work has been finished and the separation between feedback and grading—have been intermingled. First, we decided that grading is not limited to only looking back at some finished work, but can also be applied to partial work results whenever these reached some pre-specified quality level. These levels were described in rubrics. The grades are combined with feedback which is still relevant to the

work as it can be used for improvement until the final deadline. This way, grades and the associated feedback are used for looking back *and* forward, making them a more valuable combination.

Example 3: Synchronous assessment — asynchronous assessment
While synchronous direct feedback is valuable, it is often hard to realize in sufficient quantity. We were looking for a way to make asynchronous feedback as synchronous as possible which resulted in the concept of *grading request kanban* (or grading queue). After handing in a grading request, students had to add an issue on a Kanban board so that teachers always can see which grading requests are waiting for handling (see Figure 3 for an example). The effect was that most grading requests were handled not longer than 1 or days after they were handed in, so the feedback that comes with the handling was given close to the moment of finishing that part of the work. This means that feedback is given during learning and students can still act on it, some of the characteristics of effective feedback [2].

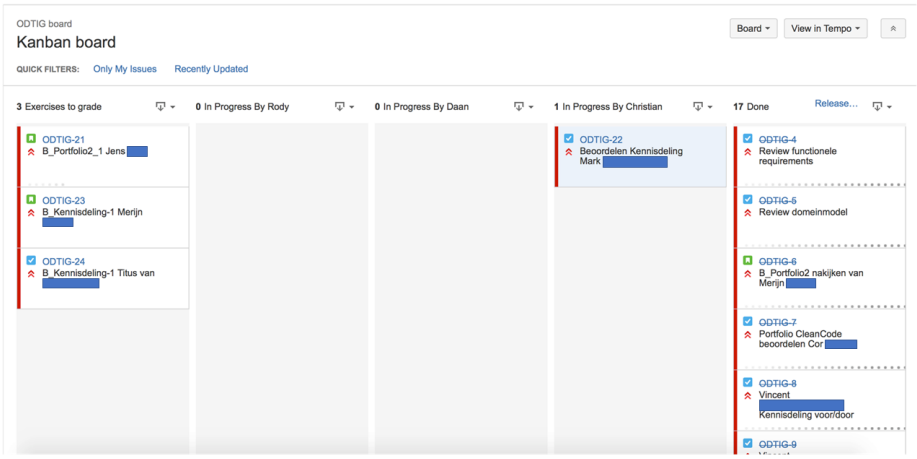

Fig. 3. Example of Grading Queue (adapted from [7])

Other dichotomies

Besides the above described dichotomies, some other dimensions were identified and partly taken into account during assessment design. These are:

– *Private vs public progress* and *group vs individual progress* – Based on the individual student dashboards, there could also be a public dashboard showing the (average) progress of the group (which is also a usual practice in

agile software development teams). This way students can evaluate their own progress compared to the rest of the group and it furthermore could lead to an increased awareness of a community of learners.
– *Generic vs idiosyncratic assessment* – while the current educational system usually requires generic assessments for (perceived!) fair grading, the more effective way is idiosyncratic, individual and personal. This is addressed through generic rubrics which are applied individually (or in small groups) by the students for getting individual and personal assessment and feedback.

4 The Pattern Language of Incremental Grading

As stated earlier, the design process was based on the Assessment-Driven Course Design approach [1]. This means that the foundational patterns of this approach are also essential elements of the pattern language of Incremental Grading. The design steps following this initial design phase required the search for design patterns and/or educational good practices which address the phenomena mentioned in the first section as well as other questions and problems which emerged during the iterative design cycles. Explicit part of this search was the exploration of solution spaces as result of applying hybridity as guideline.

The patterns were grouped in three categories: (a) core patterns which are essential for the implementation of Incremental Grading, (b) patterns which are enhancing the desired positive effects of Incremental Grading, and (c) patterns which might have been applied already, but whose positive effects are enhanced when applying Incremental Grading as assessment approach.

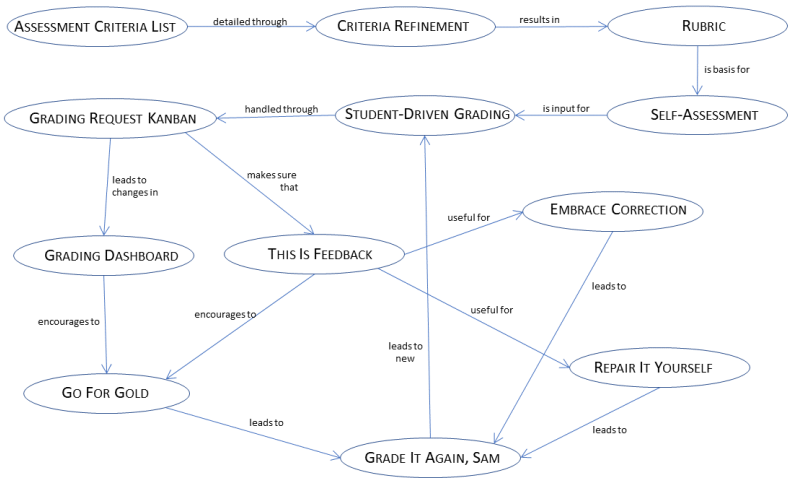

Fig. 4. The core of the pattern language (adapted from [7])

Figure 4 shows the core of the pattern language.

Figure 5 gives an overview of the pattern language, a complete description can be found in [7]. Not all of these patterns have been documented as such, therefore some of the identified good practices were also described as educational design patterns [6].

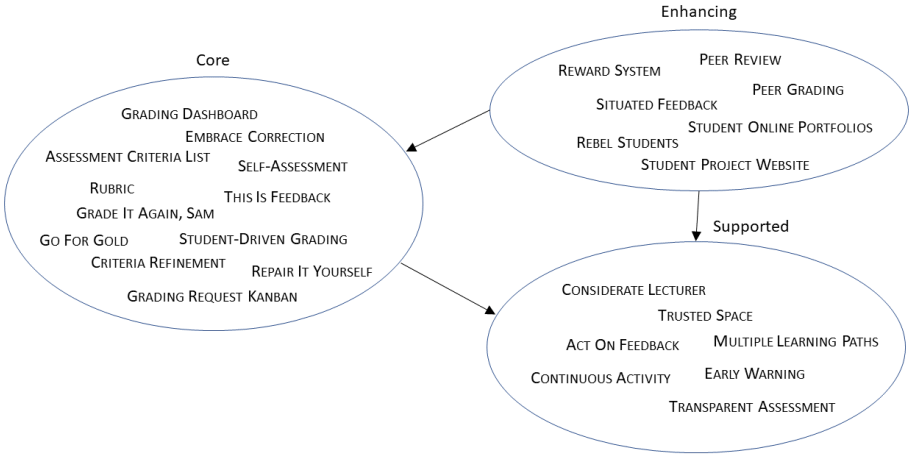

Fig. 5. Overview of whole pattern language (adapted from [7])

The patterns which have been selected while using hybridity as guideline and which relate to the examples given in the previous section are:

- Ex. 1 - *fixed vs continuous assessment and student vs teacher responsibility*: Student-Driven Grading, Work Self Assessment
- Ex. 2 - *grading vs geedback*: Student-Driven Grading, Work Self Assessment, This Is Feedback
- Ex. 3 - *synchronous — asynchronous assessment*: Student-Driven Grading, Grading Request Kanban

As can be seen, some patterns address different hybrid aspects.

5 Conclusion

In this paper we described how hybridity was used as guideline during the design of an assessment approach. This resulting assessment approach—Incremental Grading—potentially addresses some of the impeding phenomena which can be observed in many standard assessment designs. The approach consists of a collection of interrelated educational design patterns and forms a pattern language. The design of this approach forms the base for design-based research on its effectiveness which will be done in future work.

We furthermore will research what the concrete effects are of the various hybrid aspects of Incremental Grading and how using hybridity as guideline can also be applied in other areas of educational design.

References

1. Bergin, J., Kohls, C., Köppe, C., Mor, Y., Portier, M., Schümmer, T., Warburton, S.: Assessment-driven course design foundational patterns. In: ACM International Conference Proceeding Series. vol. 08-12-July (2015). https://doi.org/10.1145/2855321.2855353
2. Chappuis, J.: Seven Strategies of Assessment for Learning. Pearson College Div (2014)
3. Crowell, T.L.: Student Self Grading: Perception vs. Reality. American Journal of Educational Research **3**(4), 450–455 (2015). https://doi.org/10.12691/EDUCATION-3-4-10, http://pubs.sciepub.com/education/3/4/10/
4. Edwards, N.M.: Student Self-Grading in Social Statistics. College Teaching **55**(2), 72–76 (apr 2007). https://doi.org/10.3200/CTCH.55.2.72-76, http://www.tandfonline.com/doi/abs/10.3200/CTCH.55.2.72-76
5. Kohls, C., Köppe, C., Pedersen, A.Y., Dalsgaard, C.: Outside In and Inside Out: New Hybrid Education Patterns. In: Proceedings of the 23rd European Conference on Pattern Languages of Programs - EuroPLoP '18. pp. 1–9. ACM Press, New York, New York, USA (2018). https://doi.org/10.1145/3282308.3282330, http://dl.acm.org/citation.cfm?doid=3282308.3282330
6. Köppe, C., Manns, M.L., Middelkoop, R.: Patterns for Improving Assessment Design. In: Preprints of the 26th Conference on Pattern Languages of Programs, PLoP'19. Ottawa, Canada (2019)
7. Köppe, C., Manns, M.L., Middelkoop, R.: The Pattern Language of Incremental Grading. In: Proceedings of the 25th Conference on Pattern Languages of Programs, PLoP'18. Portland, OR, USA (2019)
8. Rorabaugh, P., Stommel, J.: Hybridity, pt. 3: What Does Hybrid Pedagogy Do? - Hybrid Pedagogy (2012), http://www.digitalpedagogylab.com/hybridped/hybridity-pt-3-what-does-hybrid-pedagogy-do/
9. Strong, B., Davis, M., Hawks, V.: Self-Grading In Large General Education Classes: A Case Study. College Teaching **52**(2), 52–57 (apr 2004). https://doi.org/10.3200/CTCH.52.2.52-57, http://www.tandfonline.com/doi/abs/10.3200/CTCH.52.2.52-57