**Self and peer assessment: a wireless online solution to fast large class feedback**

LTIF Project 2008: Anthony Bedford

**Introduction**

The aim of this project was to solve two ongoing problems faced in a large class utilising peer and self assessment. Firstly, the need for a swift turn-around process of summarising and returning evaluation to students from the peer and self evaluation process. The major outcome of this project was to implement a semi-automated process, employing both online and offline tools, capable of collecting and collating the assessment data, providing individual results and aggregated statistics, and deploying the data to students via email and Black Board. Secondly, there is a concern with a lack of student response variability, and some misalignment between qualitative and quantitative feedback. A major secondary aim of the project was to redefine the assessment criteria away from the classic 5-point Likert scale to a more descriptive Multi-point Rubric style. It is hoped this will assist students in applying the criteria to the presentations, and produce more accurate assessments and more useful feedback to presenters.

**Benefits of Peer and Self Assessment**

The benefits of peer and self assessment are acknowledged to be many and varied. In an era where students are required to develop strong generic skills alongside those skills specific to their area of study, the use of peer and self assessment can make a valuable contribution to the development of professional skills (Ballantyne et al, 2002; Falchikov, 2005; Magin & Helmore, 2001; McGourty, 2000). Among these are the ability to assess the work of colleagues (Magin & Helmore, 2001; Raban & Litchfield, 2007), to assess the quality and value of one’s own work (Cheng & Warren, 1999; Langan et al, 2005; Topping, 1998) and to learn to accept, consider and act upon feedback on one’s own work (McGourty et al, 2000; Raban & Litchfield, 2007). Development of these skills requires students to be actively involved in their own and others’ learning. While assessing others, students can develop their ability to listen, concentrate, analyse, and apply criteria (Falchikov, 2005) at the same time they are consolidating their own understanding (Langan et al, 2005; Topping, 1998), and developing a frame of reference for effective presentation of information (McGourty et al, 2000). Self assessment, and reception of peer review, encourages students to reflect on their own learning (Ballantyne et al, 2002; McGourty et al, 2000), and can increase independence and understanding (Falchikov, 2005; Langan, 2005). In presenting to their peers, students are effectively teaching the information, increasing their own chance of retaining what they have learned (Biggs & Tang, 2007). This exposition, and the questions and discussions which may ensue are “. . . invaluable ways of increasing one’s own understanding and of glimpsing another’s point of view” (Falchikov, 2005, p.249).

As noted by Magin & Helmore (2001), a benefit of peer assessment of oral presentations to a class is that it provides a measure of how effectively the information presented was understood by the intended audience. “From this perspective, peer assessments have a special claim to face validity” (Magin & Helmore, 2001). Further to this, Davies (2003) notes that feedback from their peers can, at times, have more value to students than that of a teacher by being easier to understand. Falchikov (2005) also emphasises the importance of the feedback component of peer assessment, over the actual allocation of marks, as being of benefit to both assessor and presenter. She argues that presenters value the feedback of other students as “. . . they care what other people, including their peers, think about them (Falchikov, 2005, p.171).” Along with other researchers, she has also found that students who assess the work of their peers actually benefit in terms of their own learning (Ballantyne et al, 2002; Falchikov, 2005; Topping, 1998). In fact, many researchers have found that, despite some reluctance, the majority of students find peer assessment a positive and valuable experience which contributes to their understanding (Ballantyne et al, 2002; Cheng & Warren, 1999; Davies, 2000).
Concerns Associated with Peer and Self Assessment

There can be resistance to the idea of using peer assessment, mainly due to the belief (of both staff and students) that it is the teacher’s responsibility to mark work, or that students are not knowledgeable, or objective, enough to make an accurate assessment of the quality of a piece of work (Ballantyne et al, 2002; Langan et al, 2005; Miller, 2003). This can also lead to questions over the validity and reliability of peer assessment, as compared to marks and feedback from more “expert” staff. However, as regards these concerns, many studies have questioned the tendency to use a single tutor mark as an indication of true quality, and pointed out that staff marking can also show great variation (Freeman, 1995; Magin & Helmore, 2001; Miller, 2003). Most studies which explore the reliability of peer assessment do conclude that student marks tend to fall into a narrow, and very generous, range (Cheng & Warren, 1999; Falchikov, 2005; Freeman, 1995). Still, this does not prevent them being of value, particularly where qualitative feedback is also provided (Falchikov, 2005), and reliability can be enhanced by “. . . combining teacher marks with the averaged marks obtained from multiple peer ratings” (Magin & Helmore, 2001). Numerous researchers have also concluded that more specific criteria which are well explained to students, along with a wider range of marking possibilities, can improve reliability (Falchikov, 2005; Magin & Helmore, 2001; Topping, 1998). Others go further, believing that the students themselves should be involved in the development of the criteria (Kali & Ronen, 2005). In her review of the literature, Falchikov (2005) found that, while there was evidence that students viewed peer assessment more positively when they played a part in developing the criteria, there also “. . . may be fundamental limitations to the amount of power we can cede to students regarding selection of criteria” (Falchikov, 2005, p.136), including the fact that students appear to be “less challenged by their own criteria” (Falchikov, 2005, p.138). Another issue may well be the time required to involve students in developing criteria, where careful explanation of well established standards, along with examples of their application, would (be just as beneficial for students) (Ballantyne et al, 2002; Freeman, 1995; Langan et al, 2005).

This leads to another major obstacle to the utilisation of peer assessment, particularly in large courses – finding the time to manage all the processes required, from allocating groups, to collecting the peer evaluations, to collating and disseminating the data back to students (Cheng & Warren, 1999; Davies, 2003; McGourty, 2000). Increasingly, researchers are turning to technology to help them reduce the amount of time required to conduct effective peer assessment, as well as to increase the efficiency of feedback to students (Kali & Ronen, 2005; McGourty, 2000; Raban & Litchfield, 2007). Although using computers to aid in assessment is not a new idea, it does appear that this is the first project which has attempted to use such a tool for the peer assessment of individual oral presentations during class. The use of computerised peer assessment seems to be confined mainly to out of class time, for assessing contributions to, and skill development within, group projects (McGourty, 2000; Raban & Litchfield, 2007), for essay marking (Davies, 2000 & 2003), or for entering assessment of a presentation sometime in the days following (Kali & Ronen, 2005). Research regarding peer assessment of oral presentations, such as that by Langan et al (2005), Magin & Helmore (2001) and Miller (2003), tends to focus on issues such as the value of peer assessment and its reliability, although Cheng & Warren (1999) do conclude that it is necessary the to introduce technology to the process to ensure that “. . . logistical considerations do not stand in the way of attempts to incorporate peer assessment . . .” (Cheng & Warren, 1999).

Some other concerns with peer assessment as noted by researchers are collusion in allocation of marks, dominance of one group member, or lack of contribution of group members (Falchikov, 2005; Langan et al, 2005; Raban & Litchfield, 2007) but these do not apply here as presenters are assessed individually, and only by students outside their group.

History of Group Work and Peer and Self Assessment in the Course

The course is a final year course which aims to prepare students for employment as professional scientists. One author began teaching the Research Methods component in 2001, at which point he introduced a group work element. The motivation for this was to bring the activity in the course more into line with the learning objectives, by providing students with the chance to develop both generic (teamwork, presentation, analytical) and specific (critical review of journal articles, understanding
statistics) skills and knowledge within the context of their program. Students were required to critically analyse a journal article, chosen either by themselves, or their lecturer, within a small group. Each student would then present a section of the paper as part of their group’s presentation, which typically included a PowerPoint presentation, and would answer any questions from the audience. Marks were awarded to each student for their own performance, based on the quality of their presentation skills, content, materials, comprehension and overall contribution to the group.

In 2005, peer and self assessment were introduced to the group presentations. This was mainly to provide further opportunities for students to practice their analytical and critical skills, and also to encourage reflection. However, it was also an attempt to increase audience participation, as student feedback had indicated that many found just listening to several talks boring. Each student was still evaluated on their own performance and contribution to the group, as before, but now by a semi-random selection of peers (lecturer determined), whose identity was known only to the student assessing, as well as the lecturer. Between four and six surveys were completed per student: one to three by same-course colleagues (subjective assessor), one by a student from another course (objective assessor), one by the lecturer and one by the presenter (self-assessor). This method employed surveys distributed in class immediately prior to each presentation, with the lecturer pre-allocating assessors to the student presenting. Students were evaluated on 12 items, each utilising a 5-point Likert scale, under the criteria of Content, Organisation, Delivery, and Group Performance, with the opportunity to provide qualitative feedback at the end. Results were manually entered, moderated, and then returned via email to the student within the week.

Over the years, moderations have occasionally been made to the instrument either in response to student feedback, or in an attempt to streamline the process. There are two issues which have consistently caused concern for the lecturer, and these are the same two issues raised over and over again in the literature. One is the enormous amount of time it takes to administer peer and self assessment, and ensure that feedback to students is prompt. The other is the lack of variability in the marks awarded, along with a perceived inconsistency between the quantitative scores and qualitative comments given for the same presenter on many occasions. To this end, the five point Likert scale was changed to a four point rubric in phase one of the project, in an attempt to guard against the tendency for students to award a ‘3’ for many components. Lack of variability in scoring continued to be a problem, as did the frequent seeming lack of agreement between written feedback regarding a presentation, and the scores awarded. However, the use of peer and self assessment within the course has continually received praise from students, and it was decided that the effort required to address concerns with the process would be well rewarded if the result was a better learning experience for students. In the last round of trials, the score was removed, and more detailed comments remained, and variation improved markedly. These encouraging results are the subject of further inter and intra group analysis.

The Project

The online survey tool was developed mainly in order to address the large amount of time expended by the lecturer in collecting and entering the feedback data, collating the data, and returning it in a user friendly form to the students. It was estimated that this procedure was taking around 20 minutes per student, with an average of nine students per week. As noted in the literature, this is an enormous amount of time for academics already coping with a huge workload, and the best way to effectively streamline the process, providing a quicker turnaround, is to use technology (Cheng & Warren, 1999; Kali & Ronen, 2005; McGourty, 2000; Raban & Litchfield, 2007).

The original focus of this project was four-fold:
1. Develop (after review of existing criteria) a rubric-style survey for peer and self assessment easily importable via scanning into Excel;
2. Develop an Excel-based program which allows for the input of all students into the course, and output of peer-to-student matching for evaluation based on lecturer needs;
3. Develop the Survey and Survey reader tool (i.e. the design and the reading via scanner) for swift import into Excel, also a useful University wide application;
4. Evaluation and Dissemination of the assessment via aggregated statistics on the web, and individualised email statistics to the student.

The investigation began with an extensive investigation into image-recognition technologies. Given feedback from surveys was in both qualitative and quantitative form, suitable technologies widely deployable seemed far more difficult than first thought. The purchase of a scanner (with document feeding technology) was the imperative first cost — certainly not prohibitive but an expense nonetheless. Secondly, the purchase of image recognition software was vital and this turned out to at least double the cost to each user, given additional licenses would be needed. Finally the time to decipher poorly scanned survey, then compile the reports into the final product, only marginally increased the time, given the manual component had shifted from typing to scanning.

Further investigations led to the use of online technologies, and with the advent of the netbook, the project shifted focus onto this approach. Details are given in the method section, however the frameworks are detailed below for reference.

**Old or ‘Classic’ Framework**

**Proposed Framework**
Method

Participants
Participants included 35 students (25 males, 10 females) completing a course in critical thinking and research methods. The mean age was 25.23 (SD = 5.68). These students were from four different disciplines of study within the applied sciences.

Measures and Materials

Assessment
Students were individually assessed using the Online Peer Assessment (OPA) survey (A copy of the OPA has been attached to the Appendix). The OPA is split into three sections: Identifying information, qualitative feedback, and quantitative feedback. Qualitative feedback items are presented before qualitative feedback items in an attempt to get markers thinking about their assessment before they give quantitative marks. In this section, peer markers are asked to provide comments on what the presenter did well and what they could improve on in future presentations. The qualitative section contains 11 items relating to presentation content, presenter vocabulary, comprehension, preparedness, volume, posture and eye contact, adherence to topic and time-limit, and powerpoint, boards, camera, video or props. The marking criteria were based on a four point scale with qualitative descriptors for each point. The final item was a global mark taking into consideration all other scores on previous items. This item was scored as percentage.

SurveyMonkey.com
SurveyMonkey.com was used to create and host the OPA. SurveyMonkey.com was used as it allowed flexibility in survey design along with a high quality survey delivery. The SurveyMonkey.com account that was used was protected by a password and communication between the SurveyMonkey.com website and client PC was protected with 128bit SSL encryption. Screenshots of the OPA which was completed by peer markers are presented below.
Online Presentation Assessment

2. Qualitative Feedback

* 1. Please provide at least one comment on what the presenter did well.


* 2. Please provide at least one comment on what you feel the presenter could improve on.


Next
Netbooks

The OPA was delivered online across the pre-existing RMIT Wireless network with the aid of netbook PCs available from SMGS. Netbook PCs have the advantage of being highly portable due to their very small form factor. This allowed students to complete the OPA in the lecture venue. However, there was nothing unique to the netbooks which would not allow students to complete the OPA on their own notebook PCs. The netbooks were connected to the RMIT wireless network according to RMIT wireless standards. The netbooks used Windows XP and Google Chrome to deliver the OPA. Due to the frequently occurring difficulties with connecting to the RMIT Wireless network, paper copies of the OPA were also on hand.

Procedure

Five minutes before the commencement of a group presentation, the netbooks PCs were handed out to peers assessors in the audience. Usually, students would volunteer at random as it was part of their course requirement that they complete a minimal number of peer assessments. Each presenter in a group had four assessors. One of the assessors was always the lecturer, and the other three were random peers from the audience. Peer markers were informed of the presenter that they were required to assess by a small post-it note attached to the netbooks when they were distributed before the presentation.

During the progress of the presentation, peer markers were free to write and mark their designated presenter on the netbooks. The lecturer, who assessed all presenters in a group, used paper copies of the OPA which would later be entered online, although he too could use the online technology. Once the presentation had been completed, peer markers where given five minutes to finalise their marks and comments and hand their netbooks to another peer assessor for the second presentation. Again, the post-it note attached to the netbook indicated to the peer assessor who they would be assessing in the second talk. The process would then be completed a second time.

Unfortunately, it was quite common that a few of the netbooks would refuse to connect to the RMIT wireless network or drop out and lose their connection during a presentation. In this event,
students were instructed to complete a paper copy of the OPA which was available if needed. Connection problems were more common at the start of the semester than they were towards the end, as the researchers became familiar with troubleshooting and re-connecting the netbooks. However, the continual and significant problems with getting the netbooks connected are a limitation to this method and require the support of ITS. The presenters were also encouraged to complete the OPA on themselves for self-reflections purposes. They were given the link to the OPA so they could complete it in their own time, although ideally would also do this at the conclusion of their presentation.

Upon completion of the presentations, all netbooks were collected and returned for recharging. This is an important step, as the batteries are usually only enough for one peer assessment session (1 hour). After the class, the lecturer would also take time to submit their marks and comments entered on their paper copy. The lecturer would also take the time to submit any paper copies of the OPA that were completed by students. This enabled all the marks and qualitative feedback to be uploaded and stored on a central server ready for download and analysis.

After all the presentation marks and comments are entered into the SurveyMonkey.com server, the lecturer would download an Excel spreadsheet containing all the data. The data would then be quickly cleaned to remove invalid responses (caused by drop-outs) and moderate qualitative feedback. The clean data was then copied to a marking spreadsheet which was designed to query student names and automatically compile a detailed marking report for each presenter. An example of one of these reports has been attached to the appendix. The report would then be saved as a PDF document and personally emailed to the presenter.

Table 1 contains a detailed break down of the time required at each step of the online peer assessment process after the completion of the presentations. Once the initial three steps are completed, the actual generation of student's reports is quite timely. The process is especially efficient in terms of economies of scale.

Table 1 - Time Break Down for Online Peer Assessment Process

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
<th>Estimated Time</th>
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<tbody>
<tr>
<td>1. Enter paper marks*</td>
<td>Assessments completed on paper copies are entered into SurveyMonkey.com via the OPA after class at a computer with an internet connection.</td>
<td>Depends on how many connection issues were experienced with netbooks. Generally around 20-30mins.</td>
</tr>
<tr>
<td>2. Download OPA dataset from SurveyMonkey.com</td>
<td>The lecturer requests to download the OPA dataset from SurveyMonkey.com using their secure login. The dataset is downloaded in a Microsoft Excel spreadsheet format.</td>
<td>5-10mins</td>
</tr>
<tr>
<td>3. Clean OPA dataset and copy into presentation marking spreadsheet</td>
<td>Due to connection issues, the OPA dataset may contain incomplete survey entries. These are eliminated. Qualitative comments are also moderated and checked for spelling and grammar mistakes.</td>
<td>10-20mins</td>
</tr>
<tr>
<td>4. Generate Student report and email student</td>
<td>A semi-automated report is compiled for each student which contains qualitative and quantitative feedback along with their final grade. The student is then personally emailed with their report in PDF format.</td>
<td>3-5mins per student</td>
</tr>
</tbody>
</table>

*step is only valid when technology falters

Peer Assessment Evaluation and Feedback: Student's Perspective

The following details qualitative and quantitative feedback from the survey completed by the participants at the end of the semester. The overwhelming scores indicate the use of technology a success, with the only major negative the capability of the network.
Positives
- Generally an effective way of gathering data
- Overall general satisfaction and acceptance of the use of netbook technology in the classroom

Negatives
- Quantitative component before qualitative component
- Could not move between pages of the survey
- Some students had issues with the use of Google Chrome. For some reason they felt it was buggy.
- Serious connection issues with RMIT Wireless
- Later groups may have been advantaged after the initial issues with the netbooks were rectified
- Netbooks may be too small for some people to use efficiently
- Issues were raised with the actual feedback assessment sheet. It may not be adequately measuring the critical analysis of the presentations.

Reflection
- Iron out technological issues with wireless connection – talk to ITS
- Review and update presentation assessment topics. Eliminate poor topics and refresh with current articles
- Review peer assessment presentation marking criteria. This will be done to ensure the inclusion of a critical thinking criterion.
- Review structure of the SurveyMonkey.com peer assessment survey

Six questions detailing the new technology were asked as outlined in the figure below

1. A quick way to complete my assessment
2. More effective than a paper based method
3. A effective use of technology
4. Easy to use
5. I was satisfied by the method of feedback (as opposed to hand written)
6. I was satisfied with the turn around time of feedback (from presentation to email)

Item 1 (quick way to complete assessment) and Item 6 (satisfied with the turn-around time from presentation to email) received 100% agreement. The uptake of the new technology received over 90% agreement, with the lowest level of agreement 70% for its effectiveness over paper based methods.

Impact on GTS and student experience

GTS scores have improved markedly in the last three years. Noticeably, the change was largest in the trial period. In 2008, GTS was 67.6%, OSI 71%. In 2009, GTS was 79.2%, OSI 82.4%. Importantly, item 5 (Staff give me helpful feedback) improved from 71% to 82%, Item 15 (active participation) improved from 70% to 88%, and 20 (The staff put a lot of time into commenting on my work) improved from 61% to 82%.
Variation in grades

In order to address the issues of lack of variability, missing or poor qualitative feedback, and the lack of agreement between qualitative and quantitative feedback, a few changes were made to the feedback form before it was transformed into an online survey. The initial adjustment made was to request qualitative feedback from assessors first, rather than quantitative responses. It was hoped this would encourage students to critically analyse their impressions of the quality of the presentation, with a view to providing helpful feedback to the presenter, before they focus on awarding marks linked to specific criteria. While many past students provided comments, there were several who did not. Asking students to provide qualitative comments first emphasises the importance of critical feedback, and, according to at least one study, should provide a better response rate than when it is requested as the last item (Darby, 2007). As an important component of the reflection process, the survey was then set up in such a way that students must provide at least one positive comment, and one suggestion for improvement, before they are able to move on to the allocating of marks for a presentation. We believe it is important that assessors are able to focus on the positive, as much as it is important that presenters receive acknowledgement for what they have done well. The request for a comment on “what the presenter did well” came first, as in previous iterations positive comments were typed first. Besides encouraging a positive response it was hoped that, “Giving positive feedback first might reduce assessee anxiety and improve assessment of negative feedback” (Topping, 1998). It was also felt that students would benefit from genuinely helpful comments on their strengths and weaknesses and, the broader the range of opinions, the more useful they would be. This idea is echoed by other researchers, like Ballantyne et al, (2002), Davies (2000) and Falchikov (2005).

Changes to the criteria were minimal, as they had been reconsidered each year leading to this project, and the four point Rubric introduced the year prior was maintained. However, the numbers 1-4 were removed from descriptions under each category of performance, in an attempt to encourage assessors to consider how well a presenter fulfilled the specific criteria, as opposed to the apparent tendency to award a mark out of four. Also added was a request for a global mark. This is in line with much of the literature, which indicates that greater reliability results from a wider scoring range and/or a global mark (Falchikov, 2005; Freeman, 1995; Magin & Helmore, 2001; Miller, 2003). The final item on the feedback form was changed to “Considering your responses to the previous criteria, please give an overall mark out of 100 for this presenter.” Thus, where an assessor believes that a presentation is worth more than 50%, but is not good enough to receive 75%, they will no longer have to choose between one and the other (i.e. 3 or 4). They could award, for example, 62% if they think it is somewhat better than 50%, or 71% if they think it is almost worth 75%. It is hoped that this will provide a greater opportunity to differentiate between presentations, and a higher degree of variability in marks awarded. It also may provide students with a greater sense of ownership and, therefore responsibility, as they can award a mark they believe a presentation deserves, rather than having to choose from a narrow range of provided options.

An analysis was conducted on the variation between cohorts in 2007, 2008 and 2009. The variation compared was the final grade. This score had caused greatest concern for staff, as it was felt that scores were too high for poorer presentations, and too low for better presentations. In essence, a regression to the mean effect seemed evident.

Preliminary comparisons indicate that variation has increased significantly with the implementation of the rubric. In 2006 and 2007 a 5-point Likert was deployed, in 2008 a 4-point without rubric, and in 2009 the 4-point with rubric. The results are tabled below

<table>
<thead>
<tr>
<th>Year</th>
<th>Mean</th>
<th>s</th>
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<tbody>
<tr>
<td>2006</td>
<td>77.0%</td>
<td>6.0%</td>
<td>43</td>
</tr>
<tr>
<td>2007</td>
<td>75.7%</td>
<td>7.7%</td>
<td>44</td>
</tr>
<tr>
<td>2008</td>
<td>78.5%</td>
<td>5.6%</td>
<td>34</td>
</tr>
<tr>
<td>2009</td>
<td>74.0%</td>
<td>9.2%</td>
<td>35</td>
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A more detailed analysis (within and between groups and years) is planned in further work.
SUMMARY

The benefits were clear across a number of key areas:

1. Environmental impact – Technology reduces the dependence on paper and ink, and utilises an existing service.
2. Time (academic) – Most academics are short of this and the reduction in data entry and analysis time was large.
3. Time (student) – The turn-around time for the presenters was important – receiving feedback in a timely manner is an important part of the feedback process.
4. Flexibility – This technology seems only limited to the number of netbooks/laptops available and the wireless router capacity (the standard is 254 per router). The method can be deployed anywhere there is a hotspot and web access.
5. Variation – The quantitative feedback, whilst lower in range of options, yielded higher variation in response. The inclusion of rubric style criterion ratings greatly increased variation in line with lecturer expectation.
6. Quality of feedback – The qualitative comments first produced richer commentary in comparison to previous years.
7. Cost – Most students have access to a laptop, many own them. Netbooks are now under $300 and schools can feasibly buy a number of these for the cost of a single laptop.
8. Scalable – Time reduction improves proportional with class size; this improves class capacity constraints.
9. Reliability – Instantaneous data entry avoids historical bias in other methods requiring out-of-class data entry.

The simplicity of the system allows flexible surveys to be created to the lecturers needs with little knowledge of computer programming. Some technical competency is needed with connection to the wireless network, however more often than not the students utilise the technology elsewhere. The system is not constrained to portable computers; however the benefit of netbooks was evident when they were passed around the classroom with ease. The use of the wireless online solution was highly recommended from both the lecturer and the student. Efficiencies in time and scale were clear. Further, validity is high given the completion of surveys on the spot. With growing importance on immediacy of feedback, this method proved a great alternative to conventional collation of information in peer and self assessment. This could also be used in internal survey data collection – and save the university thousands of dollars.

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