Use of the Recommendation in Personalised Peer Learning Environments (RiPPLE) Platform

This semester, we will be using RiPPLE in our course. RiPPLE recommends personalised practice questions to you based on your knowledge state from a pool of questions that are generated by the teaching staff and the students. The platform visualises your current knowledge state to assist you in your learning. Our aim to provide you with a more personalised learning experience while enabling you to be more actively involved in the process.

RiPPLE provides a number of learning opportunities:
- **Designing questions** allows you to think carefully about the topics of the course and focuses attention on the learning outcomes. In addition, choosing distractors, the act of creating plausible multiple-choice alternatives, enable you to consider misconceptions, ambiguity and possible interpretations of concepts.

- **Writing explanations** for the questions you have created allows you to express your understanding of a topic with as much clarity as possible. This helps to develop your written communication skills and deepen your understanding of the course content.

- **Answering questions** related to the course content reinforces learning, and incorporates elements of self-assessment. You will receive immediate feedback and are shown how others have answered the same questions, allowing you to gauge how well you are coping with the course. Also, evaluating the quality of the answered questions incorporates higher-order cognitive skills, enabling you to consider what makes a question to be effective.

- **Visually viewing your knowledge state** enables you to study more efficiently and effectively.

- **Receiving tailored question recommendations** enables you to get practice questions tailored to your personalised needs.

Overview of the RiPPLE Platform

Creating Questions

You will be creating assessment items in form of multiple-choice questions (MCQs) to assess other user's success in mastery of the concepts taught in this course. Creating a new question includes:

1. Developing the body of a MCQ. Text, images, videos and scientific formulas may be used in the development of the body of the question.
2. Tagging the question with one or more concepts from the full set of concepts, which are pre-assigned by the teaching staff.
3. Authoring the multiple-choice answers. Similar to the body of the question, Text, images, videos and scientific formulas may be used in the development of each of the multiple-choice answers.
4. Nominating the correct answer and developing a solution. An ideal solution includes rationale for the correctness of the right multiple-choice answer and the lack of correctness of the other multiple-choice answers.
5. Submitting the question to be stored as part of the question repository. The platform allows you to preview your question before submitting it. This will help you to ensure that your question renders as anticipated.

6. The platform also allows you to edit your submitted questions at a later time.

Overview of the question creation page

Answering Questions

You can complete and evaluate questions that are associated with this course. Once you have answered a question, you are able to view the right answer, the distribution of how the question has been answered by your peers, the explanation provided for the question and comments made about the questions. You can then add your own comments, and rate the correctness and effectiveness of the question.

Overview of the question answering page

Rating Questions

In rating the correctness of the answered questions, consider the following criteria:
1. The question is clearly worded and does not contain obvious spelling or grammatical errors.
2. There is only one correct answer to the question, and the author has correctly identified this answer.
3. The author's explanation is clear and thorough.

In rating the effectiveness of the question, consider the following criteria
1. The question reinforces learning from the content covered in the course.
2. The author has provided a good solution to the question: their explanation must be helpful to someone who answers their question incorrectly.
3. All other options must seem plausible – avoid using "silly" alternative answers.
4. You personally found the question helpful to your own learning.

Reporting Inappropriate Questions

Beyond creating and evaluating questions, we rely on the collective wisdom of the students for identifying inappropriate content. Students can flag questions as incorrect or inappropriate, as demonstrated below. Teaching staff can then view the list of the questions that have been flagged as inappropriate by the students and edit or delete them as they see appropriate.

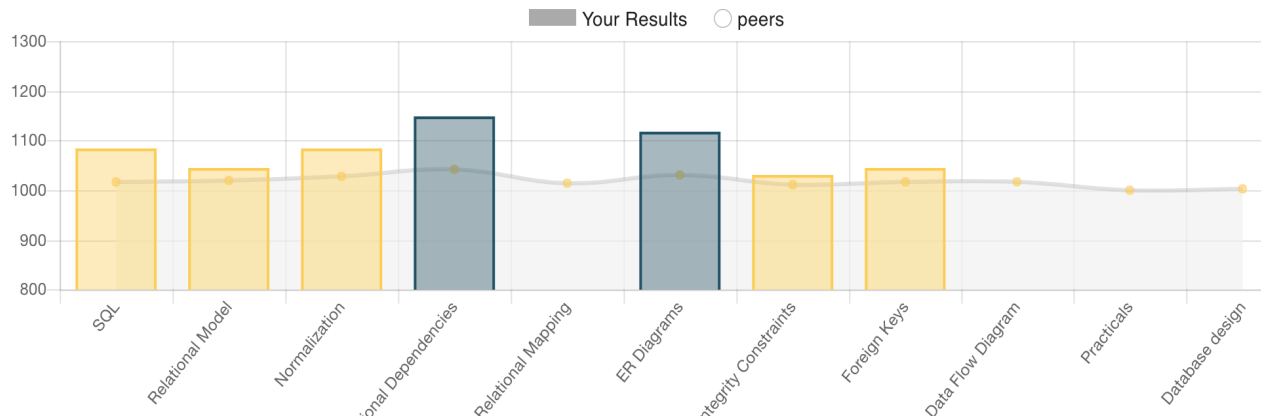## Visualisation of Your Knowledge State

The RiPPLE platform approximates your knowledge state based on your competency on each of the concepts of the course. Knowledge states are computed using the Elo system as a zero-sum game between users and questions. The basic principles of the system are simple:
- Each user is assigned a rating, initialised to 1000, on each of the course topics. If a user has not yet answered any questions on a topic, they will not have a rating for that topic.
- Each question is also assigned a rating, which is initialised to 1000. These ratings will be used to gauge the difficulty level of the question.
- If the question is answered correctly, the user's rating on the topics associated with the question increases and the rating of the question decreases. If the question is answered incorrectly, the user's rating on the topics associated with the question decreases and the rating of the question increases.
- The update to the ratings is proportional to the difference between the concept ratings of the user and the rating of the question. If a user who is highly rated in a concept correctly answers a low-rated question associated with the same concept, then only a few rating points will be transferred from the low-rated question to the user. However, if a user with a low rating in a concept correctly answers a high-rated question associated with the same concept, then many rating points will be

transferred. This rating system is self-correcting, meaning that the ratings, in the long run, should correctly reflect users' knowledge states and questions difficulty levels.

Sample knowledge state of a user. The line chart represents the average ratings across all users.

Selection and Recommendation of Questions

RiPPLE enables you to select questions using search and recommendation functionalities. The "Sort By" option allows you to sort questions based on their difficulty, effectiveness, number of responses, number or number of comments. It also enables you to sort questions based on their learning benefits to you. Recommendations are based on your current knowledge state. The platform aims is to recommend effective questions that are at the right level of difficulty for you.

The "Filter Topics" option enables you to filter the questions that are included in the results based on their concepts. The "Filter Questions" option enables you to view all questions (default), uncompleted questions, completed questions, or your own questions. The "Search" option enables you to search for questions based on specific content that may be present in the question.


Overview of the selection and recommendation page

Leaderboard

The leaderboard page displays individuals with highest achievements on a number of tasks including their overall rating, the number of questions contributed, answered, correctly answered, and rated. Each user will also see their own ranking and achievements on the leaderboard.

Rank	📷 Avatar	🪪 Name	👤 User Rating	📑 Questions Contributed	↩ Questions Answered	✓ Answered Correctly	★ Questions Rated	✦ Achievements
1		Kristen	1275	2	32	31	27	0
2		Marcia	1264	1	31	30	22	0
3		Jessica	1231	4	30	28	20	0
4		Michael	1227	2	32	29	33	0

Overview of the Leaderboard page

Assessment

1. Creating and Answering Questions (up to 8 marks)

There will be a total of 4 rounds of authoring and answering questions. Each round will be worth up to 2 marks Here are the dates associated with the rounds:

- Round 1: start of Week 1 – end of Week 3
- Round 2: start of Week 4 – end of Week 6
- Round 3: start of Week 7 – end of Week 9
- Round 4: start of Week 10 – end of Week 13

To receive the marks associated with a round you would need to do the following during the duration period associated with the round:

1. Create at least one correct and effective multiple-choice question. The correctness and effectiveness of your question will be evaluated by the teaching staff and your peers. Questions considered as incorrect or ineffective by staff are deleted from the platform.
2. Correctly answer and rate at least 10 new questions on your first attempt.
   a. In rating the correctness of the answered questions, consider the following criteria:
      - The question is clearly worded and does not contain obvious spelling or grammatical errors.
      - There is only one correct answer to the question, and the author has correctly identified this answer.
      - The author's explanation is clear and thorough.

   b. In rating the effectiveness of the question, consider the following criteria
      - The question reinforces learning from the content covered in the course.
      - The author has provided a good solution to the question: their explanation must be helpful to someone who answers their question incorrectly.
      - All other options must seem plausible – avoid using "silly" alternative answers.
      - You personally found the question helpful to your own learning.

2. Overall Rating (up to 2 marks)

Your overall rating is computed as the average rating across all of the concepts. You can view your overall rating on the Leaderboard page at any time.

The mark associated with your overall rating will be computed using the following formula at the end of Week 13: $Min\left(Max\left(0, \frac{overall\ rating - 1000}{100}\right), 2\right)$

This means a student with an overall rating of 1200 or higher will receive 2 marks. A student with an overall score less than 1000 will not receive any marks in this category, and a student with a score between 1000 and 1200 will receive partial marks. The Min and Max functions are used to ensure that your mark is between 0 and 2.

3. Bonus Mark

The top 5% of students with the highest "rating" are rewarded a bonus mark (1 course mark) because of their significant contributions to the platform.

Writing Good Multiple-Choice Questions

We strongly recommend finding a RiPPLE partner so that you can proofread each other's questions before you post your questions on the platform. This is a very common practice: all academics in Australia (and most other parts of the world) are expected to have their final exams checked by other academics.

Here are some more tips:

- Avoid spelling and grammar mistakes.

- Avoid trick questions - do not write questions where it is unclear what you are testing. Rather than trying to hide the correct answer behind a trick, ask a question that really determines whether or not someone understands an important concept.

- Writing the distracters is probably the hardest part. Your distracters should be plausible and not easily dismissed as incorrect or illogical. This makes answering the question by process-of-elimination more difficult. You want to test people on what they know, not their ability to simply recognize an incorrect answer.

- Don't forget to write a clear explanation as to why the correct answer is correct, and ideally why the incorrect answers are incorrect. These questions are a great opportunity for learning, but only if you provide some guidance about the correct answer.

- Don't rush your question – writing a good MCQ is challenging, even for instructors!