TLEF Project – Final Report

Report Completion Date: (2022/05/01)

1. PROJECT OVERVIEW

1.1. General Information

Project Title:	An online study space that supports self-regulated learning		
Principal Investigator:	Georg Rieger		
Report Submitted By:	Georg Rieger		
Project Initiation Date:		**Project Completion Date:**	April 30, 2022
Project Type:	☐ Large Transformation x Small Innovation ☐ Flexible Learning ☐ Other: [please specify]		

1.2. Project Focus Areas – *Please select all the areas that describe your project.*

x Resource development (e.g. learning materials, media)

☐ Infrastructure development (e.g. management tools, repositories, learning spaces)

x Pedagogies for student learning and/or engagement (e.g. active learning)

☐ Innovative assessments (e.g. two-stage exams, student peer-assessment)

☐ Teaching roles and training (e.g. teaching practice development, TA roles)

☐ Curriculum (e.g. program development/implementation, learning communities)

☐ Student experience outside the classroom (e.g. wellbeing, social inclusion)

☐ Experiential and work-integrated learning (e.g. co-op, community service learning)

☐ Indigenous-focused curricula and ways of knowing

x Diversity and inclusion in teaching and learning contexts

x Open educational resources

☐ Other: [please specify]

1.3. Final Project Summary

1.4. Team Members – *Please fill in the following table and include **students**, undergraduate and/or graduate, who participated in your project.*

Name	Title/Affiliation	Responsibilities/Roles
Georg Rieger	Associate Professor of Teaching, Physics & Astronomy and Vantage College	Project development, team-leader, development of SRL activities. Implementation in class (PHYS 118). Author on publications
Jess McIver	Assistant Professor, Physics & Astronomy	Development of SRL activities. Implementation in class (PHYS 118). Co-author on publications
Silvia Mazabel	Grad student, now postdoc Faculty of Education, now EOAS	SRL-related consulting. Co-author on publications.
Sean Cooper Shovon Biswas	Grad student, Physics & Astronomy Grad student, Physics & Astronomy	Co-developer of ABCD grading, initial phase of project. Content development and coding.
Xinyu Bai, Jiuyang Fu, Jingxuan Gao	Undergraduate Students: Vantage College, Applied Sciences	Fine-tuning of reading (Jiuyang and Jingxuan), technical sketches (Xinyu)

1.5. Courses Reached – *Please fill in the following table with **past**, **current**, and **future** courses and sections (e.g. HIST 101, 002, 2017/2018, Sep) that have been/will be reached by your project, including courses not included in your original proposal (you may adapt this section to the context of your project as necessary).*

Course	Section	Academic Year	Term (Summer/Fall/Winter)
PHYS 118	201	Since 2019W (ongoing)	Winter
PHYS 118	V01	Since 2020S (ongoing)	Summer

2. OUTPUTS AND/OR PRODUCTS

2.1. *Please **list** project outputs and/or products (e.g. resources, infrastructure, new courses/programs). Indicate the current location of such products and provide a URL if applicable.*

Product(s)/Achievement(s):	Location:
Additional resources for student learning, in particular videos and worksheet questions. Shortened, streamlined reading assignments. Additional scaffolding.	The additional resources were integrated into the existing resources of PHYS 118 on edge.edX.
Development of a learner-centered, inclusive approach to classroom discussions	Article in The Physics Teacher (forthcoming)
Development of forward-facing feedback from tests and exams	Article in The Physics Teacher (forthcoming)

2.2. Item(s) Not Met – *Please list intended project outputs and/or products that were not attained and the reason(s) for this.*

Item(s) Not Met:	Reason:
N/A	

3. PROJECT IMPACT

3.1. Project Impact Areas – *Please select all the areas where your project made an impact.*

X Student learning and knowledge

X Student engagement and attitudes

X Instructional team-teaching practice and satisfaction

X Student wellbeing, social inclusion

☐ Awareness and capacity around strategic areas (indigenous, equity and diversity)

☐ Unit operations and processes

X Other: Development of transferrable resources (OER-resources)

3.2. What were you hoping to change or where were you hoping to see an impact with this project? – *Please describe the intended benefits of the project for students, TAs, instructors and/or community members.*

The project was originally focused on the development of online resources to help students learn outside of the classroom. The focus shifted in year two towards the implementation of supporting students' self-regulated learning in class due to involvement of Silvia Mazabel who brought in ideas and expertise from the field of self-regulated learning (SRL). This led instructors Georg Rieger and Jess McIver to adopt SRL-supportive pedagogy in their large first-year physics course. The emphasis in class was on practicing task interpretation and developing initial ideas with worksheets and clicker questions, as well as inclusive feedback practice in class discussions.

3.3. Were these changes/impacts achieved? How do you know they occurred? – *How did you measure changes/impacts? (e.g. collected survey data, conducted focus groups/interviews, learning analytics, etc.) Describe what was learned from this process. You are encouraged to include copies of data collection tools (e.g. surveys and interview protocols) as well as graphical representations of data and/or scenarios or quotes to represent and illustrate key themes.*

We used data from the 2019W midterm examination in PHYS 118 and found improved performance that can be traced back to the emphasis on task interpretation and writing initial ideas. Students used more useful annotations (sketches, relevant equations) in their midterm in the SRL-focused lecture section compared to the other lecture section that used the same pedagogy and materials, but did not have the focus on SRL.

We also conducted a survey in 2020W and asked students about their experience in the course. We included questions regarding our implementation of ABCD grades, which are averages for particular question types. For this, test and exam questions are classified into four types (definitions, comprehension, calculations, transfer) and actions in form of study tips are provided for the four types. Based on their average performance students can decide which area to focus on. Survey results show that students paid attention to these grades and found them 'somewhat helpful' on average.

3.4. Dissemination – *Please provide a list of **past** and **upcoming** scholarly activities (e.g. publications, presentations, invited talks, etc.) in which you or anyone from your team have shared information regarding this project. Be sure to include author names, presentation title, date, and presentation forum (e.g., journal, conference name, event).*

In chronological order:

CTLT Winter Institute: L. Ferreira, J. Walsh-Marr, K. Lyon, J. McIver, G. Rieger and S.Mazabel "The SRL Paradox: How Instructor Presence Fosters Self-Regulated Learning", Dec, 2020 (local).

G. Rieger, J. McIver, S. Mazabel and E. W. Burkholder, "Supporting students' self-regulated learning in an introductory physics course", SALTISE 10th annual conference, June 2 - 4, 2021,

Montreal, Quebec (online, international, abstract refereed).

G. Rieger, “Isomorphic Questions”, STEM Education Research Exchange meeting (SERE), March 01 2022 (local).

G. Rieger, J. McIver, S. Mazabel, S. Cooper, and G. Lichtenberg, “Feedback from Test Grades”, Skylight End-of-Year, April 28 2022

Upcoming:

Rieger, G. W., McIver, J., Mazabel, S., Cooper, S., and Lichtenberg, G. (2022), "Getting more out of midterm assessments“, SALTISE 11th annual conference, June 2 - 3, 2022, Montreal, Quebec (online, international, abstract refereed).

Rieger, G. W., McIver, J., Mazabel, S., Cooper, S., and Lichtenberg, G. (2022), "Getting more out of midterm assessments“, The Physics Teacher (accepted, Jan. 2022).

Rieger, G. W., McIver, J., Mazabel, S., and Burkholder, E. W. (2022), “Supporting students’ self-regulated learning in an introductory physics course“, The Physics Teacher (accepted, Feb, 2022).

4. **TEACHING PRACTICES** – *Please indicate if **your** teaching practices or those of **others** have changed as a result of your project. If so, in what ways. Do you see these changes as sustainable over time? Why or why not?*

Instructors Georg Rieger and Jess McIver adopted SRL-supportive pedagogy in their large first-year physics course and will continue to do so. The additional scaffolding steps and the shift in giving feedback were fairly straightforward to implement and will be easy to sustain.

The developed resources will be useful for the foreseeable future. They are now integrated in our OER course materials on edge.edX. Other instructors have expressed interest in these materials.

5. **PROJECT SUSTAINMENT** – *Please describe the sustainment strategy for the project components. How will this be sustained and potentially expanded (e.g. over the next five years). What challenges do you foresee for achieving the expected long-term impacts listed above?*

The pedagogy developed in this project has become standard practice of the two instructors.
The project resources will be expanded and updated as needed by the PI.