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Is scalable 'students as partners' possible? Towards large-scale, inclusive, in-class partnerships

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Amid the growing practice of engaging with students as partners in learning and teaching, there have been well-known critiques of the practice's often small-scale, extra-curricular, projectbased, and often exclusive, models of student participation. In this research, we respond to these concerns through the evaluation of a whole-of-class approach to student partnership which harnessed a scalable, online peer-recommender platform known as RiPPLE (Recommendation in Personalised Peer Learning Environments). Through the platform, educators partner with students to develop a large repository of learning resources where students can contribute by authoring learning resources and/or reviewing and providing feedback on their peer's submissions. In this study, we present the evaluation of this intervention, including the development of a transferable survey instrument based on key outcomes related to student partnership. Survey results (N= 889) indicated that many, though not all, of the previously evidenced benefits of partnership occurred, for example, students' self-reported gains in learning engagement and self-efficacy about their ability to contribute learning resources. These findings suggest that large-scale, in-class partnerships have promising potential to expand the benefits of partnership at scale and open up new insights on how to leverage technology to support large-scale, inclusive learning and teaching innovations.

Keywords: student partnership, peer-learning, learning resources, co-creation, students as partners, online engagement

Introduction

For those of us interested in the practice known as 'students as partners', either as educators, researchers or 'third space' professionals, the past few years have been quite promising in the higher education sector. The phenomenon once considered radical, as it advocated for students' agency and self-determination in their own learning experiences, has now become widely accepted and celebrated, with dedicated students as partners journals, conference streams, and even an international roundtable (Cliffe et al., 2017; Mercer-Mapstone, 2020). Yet accompanying the growth and uptake of students as partners are the persistent, nagging concerns over how this beneficial practice can be scaled to include a greater number of students (Mercer-Mapstone et al., 2017). This is especially relevant given the findings which suggest that equity students may particularly benefit from student partnership experiences (Cook-Sather, 2018; Marquis et al., 2021), as the practice encourages relationship-rich pedagogical approaches that support their belongingness, self-efficacy, and navigational capabilities within the university structure (Dollinger & Lodge, 2020; Peseta & Bell, 2020).

Presented in this paper, we introduce and evaluate one potential route to scale partnership practices through a whole-of-class initiative. The approach harnessed a scalable, online peer-recommender platform known as RiPPLE (Khosravi et al., 2019), which enabled students to co-create learning resources. Underpinning the study are two distinct yet interrelated aims, the first of which is to push the boundaries on what students as partners

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'looks like' in practice. For example, widening the approach from the perception that it can only occurr in one-to-one or small group settings, to a broader understanding of how the practice can utilise technology to provide partnership-like experiences to greater numbers of students in their educational journeys. Second, we aim to evaluate the intervention through a distributed online survey to students (N = 889) mapping the benefits to well-established outcomes of previous, often small-scale, student partnership experiences. We further disaggregate our results of outcomes based on two previously cited barriers: students' beliefs of 'who' is responsible for teaching, and students' prior partnership experiences (Dollinger & Lodge, 2020). We do so to explictly understand the nuances and differences across partnership practices, with the recognition that not all partnership may take the same form, nor result in the same outcomes. Through this, we aim to contribute to the growing calls for a need of greater contextualisation in partnership approaches (Healey & Healey, 2018), as well as the suggestions to explore how partnership can be facilitated and expanded through technology (Zarandi et al., 2024). Ultimately, our findings add to the growing evidence that partnership at scale is achievable (Bovill, 2020), however, it may take on unique features and nuances that makes it distinct from traditional one-to-one partnership relationships. As we will discuss, these findings open up new insights on how educators and learning designers could leverage technology to support partnership at scale.

Framing the study

In this study, we sought to explore how the practice of students as partners could be scaled in a large, inclusive, in-class context. We recognised that by attempting this, the partnership experience provided in the intervention might not exactly resemble *traditional* partnership. For example, in traditional partnership experiences, students and staff often work closely together in a one-to-one partnership or a small group, where they iteratively, over time, collaborate towards curriculum design, assessment, or the student experience, through programs or policy-making (Cook-Sather et al., 2014; Mercer-Mapstone et al., 2017). Alternatively, in our scaled approach, we were limited by the realities of a small teaching team, tasked with a unit of over 800 students. This meant that we had to think differently about partnership and what the practice might look like.

This study began with our positioning on how to define students as partners. We grounded our approach in four key principles of students as partners, often discussed in the literature (refer to Cook-Sather et al., 2014; Dollinger & Lodge, 2020; Matthews, 2017). These include (1) recognition of the expertise of students in their lived experiences as students, (2) engaging in the process with acknowledgement of uncertain outcomes, (3) a goal to support reciprocal learning (i.e., students learning from staff and vice versa) and (4) continuous dialogue.

Our intervention was positioned around harnessing students' expertise to create and curate learning resources to support large units (Principle 1). This was further underpinned by weak boundaries around what students could create, as the students were encouraged to submit a range of resource types (e.g., multiple choice questions, worked examples, reflections and videos) (Principle 2). The intervention was also designed as a continuous feedback loop for the teaching staff, who both supported students to learn by creating and submitting resources through the class, but who also monitored resources to understand what students were interested in, and where learning gaps remained (Principle 3). This, in turn, helped teachers modify their teaching approaches in real time and address content topics or areas where students may be struggling. And finally, the intervention encouraged continuous dialogue, both through discussion of the platform in class, but also as students could rate and provide feedback on learning resources, 'recommending' what was helpful to others (Principle 4). Notably, in this study, was further our choice to communicate the RiPPLE technology and intervention to students as an opportunity to 'co-create' their learning experience, rather than engage in partnership. This decision was informed through dialogue with students, who indicated that the term 'cocreation' was clearer in this instance, rather than partner, which can spark different meanings to different people (Bovill, 2020; Dollinger & Mercer-Mapstone, 2019; Matthews & Dollinger, 2023). In such, we acknowledge that the 'partnership' in this intervention is markedly different from many students as partners practices. However, through alignment to three key principles of partnership, there are aspects of the intervention which are partnership-like, if not partnership itself. And it was through this framing, that we

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sought to explore how the scaled, technology-facilitated approach to student partnership aligned with previously reported benefits of students as partners, such as stronger relationships between teachers and students, learning gains, and student self-efficacy (Mercer-Mapstone et al., 2017).

In addition to exploring how the intervention benefited students, we also used the evaluation as an opportunity to investigate potential influencing factors of students' self-reported benefits. For example, previous research from students as partners literature has suggested that some cohorts of students who have traditional views about who is responsible for teaching may not be as open to students as partnership experiences (Dollinger & Lodge, 2020). These may include students from East Asian backgrounds who have predominantly learned in classroom contexts where the teacher is an authority figure, and where typically the teacher's knowledge is the singular version of what is 'right' (Liang & Matthews, 2021). In these cases, students may feel uncomfortable being asked to co-create curriculum or learning resources or feel that peergenerated content is of lesser quality. Related to this is also research which has suggested that students as partners is as much as ethos, as it is as a practice, and as such can be characterised by a set of beliefs, mediated by a person's prior experiences (Luo et al., 2019). To illustrate, Dollinger and Lodge (2020) in an evaluation of ten student-staff partnership case studies found that a person's prior related experiences, as well as their personal outlooks on learning and teaching, played a significant role in shaping the overall selfreported quality of the partnership experience. In other words, the more a person is exposed to students as partners, and the more they participate, the more receptible to student partnership they are likely to be. Building off these interesting findings, we framed our study through the following research questions:

- I. To what extent does a large-scale, in-class, technologically supported partnership intervention support the previously reported benefits of 'students as partners'?
- II. How do partnership benefits change based on students' perceptions of teacher responsibilities in creating learning resources?
- III. How do partnership benefits change based on students' self-reported prior experiences in creating learning resources?

Overview of RiPPLE

The tool used in this study to explore partnership is called RiPPLE (Recommendation in Personalised Peer Learning Environments). It is an online learning application designed to support greater student engagement and learning in a single course setting (Khosravi et al., 2019). Through the tool, students can create their own learning resources (e.g., multiple choice questions, worked examples and notes) and share these resources with their peers through an online repository. Importantly, however, the tool is not *only* a repository of mainly student-created resources, but also allows additional engagement as students can both moderate (i.e., evaluate) and practice with these resources, flagging mistakes or areas where the resource could be improved (See Figure 1 below).

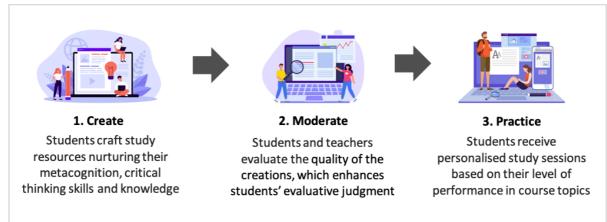


Figure 1. A basic overview of the three interconnected learning activities of RiPPLE

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One of the strengths of RIPPLE is the way it supports scaffolded, relational learning (McDonald et al., 2021). For example, students who may not have full mastery of topics are still encouraged to submit learning resources, and then encouraged to see how the resource undergoes moderation through their peers and/or teachers. The moderation process allows for the reviewers (i.e., peers and teaching staff) to both evaluate the resources and provide constructive close and open-ended feedback on the resources' effectiveness (Darvishi et al., 2022). This process, rather than an alternative such as a simple 'yes or no' to the moderation of the resource, is aimed to support a relational approach, where all expertise in the learning community is pooled towards greater learning outcomes for all (Yang & Carless, 2013). Learning resources that then ultimately garner high ratings from multiple students are incorporated into the course's bank of study material. Conversely, resources that are found lacking are returned to their creators for further refinement and eventual resubmission. This iterative process ensures that only the most beneficial resources are made available.

Implied in the name, RiPPLE also includes a 'recommendation system', or an algorithm that recommends specific resources based on a student's estimated knowledge of various course topics. This approach is designed to encourage personalisation in the learning experience, as students are suggested resources that directly relate to their learning strengths and weaknesses. Additionally, RiPPLE incorporates gamification elements like badges to motivate students and engage them more deeply in their learning. The platform includes visualisation for both students and staff to monitor performance and engagement, enhancing metacognition and decision-making (Abdi et al., 2020). It also includes assessment features that facilitate the integration of RiPPLE into course curricula. Through these interactive and reflective activities, RiPPLE strives to create a dynamic and effective learning environment. Indeed, students who used RiPPLE in their university database course improved their mid-semester exam scores by 10 percentage points compared to similar students who did not (n = 396, d = 0.54; Khosravi et al., 2019).

Research context and design

As scale was a key focus of our study, we employed a quantitative design to capture data from a large group of students. As such, our study began with instrument development, first underpinned through a review of the literature of key constructs that have been previously discussed to result from the partnership and/or collaboration process that would guide our study (refer to Table 1). Implicit in this is that we did not seek to directly ask students if partnership was achieved, as previous scholars have often discussed that the term 'partnership' can denote various meanings, both for students and scholars (Dollinger & Mercer-Mapstone, 2019), especially across cultures and contexts (Healey & Healey, 2018; Liang & Matthews, 2021) and would have thus been an inappropriate measure for this study. Further, as our research question centered around how the interventions' outcomes compared to previously reported benefits of student partnership and collaboration, the survey focused on students' perceptions of the benefits of RiPPLE intervention. To support the face validity of the survey, we further employed cognitive interviews with students during the survey development to gauge how students interpreted the questions (Memon et al., 2010). We revised accordingly and ultimately included 24 items measured on a 5-star rating scale that was end-anchored (1 star = Strongly Disagree; 5 stars = Strongly Agree). Please note, that some of the questions included in the final survey are not relevant to the current study and were aimed at how the platform could be improved (e.g., navigation) and are not included in the discussion here.

Table 1
Development of Survey Tool

Partnership benefit	Identification	Item
Teacher connection	Cook-Sather, Bovill & Felten (2014);	RiPPLE helped me feel more
	Mercer-Mapstone et al., 2017	connected with the teaching team
Peer connection	Cook-Sather, 2018; Rivers et al., (2017)	RiPPLE helped me feel more connected with my peers in the class

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Learning gains	Mercer-Mapstone et al., 2017; McMillian et al., (2020)	Creating learning resources is an effective way to learn
Self-regulated learning	Hadwin, Järvelä & Miller (2017); Mercer-Mapstone et al., 2017	I was able to track my progress towards completion of RiPPLE assessment tasks
Evaluative judgement	Matthews et al., (2023); Matthews & Cook-Sather, 2021	Moderating learning resources is an effective way to learn
Self-efficacy	Dollinger & Lodge (2020); Mercer- Mapstone et al., 2017	I believe I have useful knowledge that can support my peer's learning
Satisfaction	Andrews et al., 2018; Shaw et al., 2017	I enjoyed using the RiPPLE platform

This study was undertaken at a large, research-intensive university in metropolitan Australia. The intervention study received approval from the Institutional Human Research Ethics Committee 2023/HE001453 and data was collected across eight semesters between 2021 to 2024. The intervention was introduced in a series of courses including large first-year courses in computer science, psychology, economics and medicine. All students who participated in one of these courses were invited to participate in the evaluation presented via the RiPPLE platform. Data from 91 students who only partially completed the closed-ended items were removed.

Data Analysis

To address RQ1, we calculated and compared the level of agreement among students. This involved combining responses from "Strongly Agree" and "Agree" as well as "Strongly Disagree" and "Disagree" categories to indicate agreement or disagreement, respectively. To answer RQ2 and 3, we classified responses to the item, "I had experience creating learning resources before taking this course", as Low = 1, 2; Medium = 3; High = 4, 5. We used the same coding to classify teacher creation responsibility beliefs, using the item, "I believe that it is only the teacher's responsibility to create learning resources for a course." We then used the Kruskal-Wallis test computed on SPSS 29, due to negative skewness and heteroscedasticity for all items. Distributions of scores for all items were not similar for all groups, as assessed by visual inspection of a boxplot; hence, mean ranks were used to interpret results. Pairwise comparisons were performed using Dunn's (1964) procedure with a Bonferroni correction for multiple comparisons using adjusted p-values.

Findings

RQ1: Overall reported benefits

Overall, students highly agreed that using RiPPLE benefited their learning gains (83% agreement, 7% disagreement), evaluative judgment (78% agreement, 9% disagreement), self-regulated learning (81% agreement, 6% disagreement), and satisfaction (74% agreement, 12% disagreement). Additionally, while there was still agreement that peer connection (60% agreement, 20% disagreement) and teacher connection (57% agreement, 24% disagreement) were enhanced, consensus on these aspects was less pronounced. Figures 2 and 3 below present frequencies of agreement.

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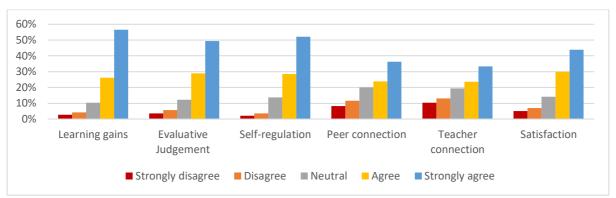


Figure 2. Frequency of agreement

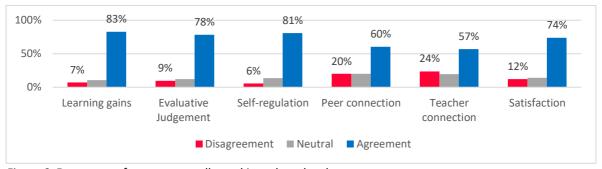


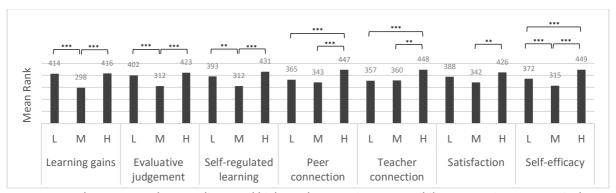
Figure 3. Frequency of agreement collapsed into three levels

RQ2: Impact of students' perceptions of teacher responsibility for creating learning resources on learning gains

We found that 41% of students had a low perception of teacher creation responsibility, while 14% had a medium perception, and 46% had a high perception. Moreover, students' perceptions influenced their self-reported learning gains, $\chi^2(2) = 31.15$, p < .001, evaluative judgment, $\chi^2(2) = 23.21$, p < .001, self-regulated learning, $\chi^2(2) = 27.82$, p < .001, peer connection, $\chi^2(2) = 31.60$, p < .001, teacher connection, $\chi^2(2) = 32.29$, p < .001, satisfaction, $\chi^2(2) = 14.08$, p < .001, and self-regulated learning, $\chi^2(2) = 41.55$, p < .001. Figure below displays the mean ranks and statistically significant differences. The post hoc analyses revealed that students with low perceptions of teacher creation responsibility reported higher learning gains (mean rank = 414), evaluative judgment (mean rank = 402), self-regulated learning (mean rank = 393), and self-efficacy (mean rank = 372) than students with medium perceptions (mean rank = 298, 312, 312, 315, respectively; $ps \le .001$). Students with medium perceptions reported lower learning gains, evaluative judgment, self-regulated learning, peer connection, teacher connection, satisfaction, and self-efficacy than those with high perceptions (mean rank = 416, 423, 431, 447, 448, 426, 449, respectively; $ps \le .001$). Students with low perceptions had lower peer connection (mean rank = 365), teacher connection (mean rank = 357), and self-efficacy (mean rank = 368) than students with high perceptions ($ps \le .001$). There were no statistical differences between all other comparisons.

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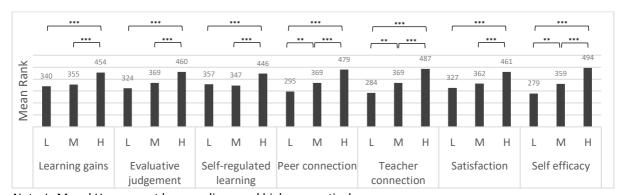


Note. L, M and H represent low, medium, and high teacher creation responsibility perceptions, respectively. $^{**}p < .01, ^{***}p < .001$

Figure 4. Mean Ranks of Students' Self-Reported Gains Disaggregated by Students' Perception of Teacher Responsibility

RQ3: Impact of prior experience on co-creating learning resources on learning gains

We found that 33% of students had low prior co-creation experience, 18% had a medium perception, and 49% had a high experience. Moreover, students' level of experience influenced their self-reported learning gains, $\chi^{2}(2) = 56.84$, p < .001, evaluative judgment, $\chi^{2}(2) = 68.36$, p < .001, self-regulated learning, $\chi^{2}(2) = 38.83$, p < .001.001, peer connection, $\chi^2(2) = 111.43$, p < .001, teacher connection, $\chi^2(2) = 132.97$, p < .001, satisfaction, $\chi^2(2) = 132.97$, p < .001, satisfaction, $\chi^2(2) = 132.97$, $\chi^2(2) = 132.97$, 63.57, p < .001, and self-regulated learning, $\chi^2(2) = 163.12$, p < .001. Figure 5 below, displays the mean ranks and statistically significant differences of self-reported partnership gains based on students' level of cocreation experience. The post hoc analyses revealed that students with high prior creation experience reported greater learning gains (mean rank = 454), evaluative judgment (mean rank = 460), self-regulated learning (mean rank = 446), peer connection (mean rank = 479), teacher connection (mean rank = 487), satisfaction (mean rank = 461), and self-efficacy (mean rank = 494), than those with medium (mean rank = 335, 369, 347, 369, 369, 362, 359 respectively; ps < .001), and low experience (mean rank = 340, 324, 357, 295, 284, 327, 279, respectively; ps < .001). Those with medium experience had higher scores than those with low experience regarding peer connection (mean rank = 295), teacher connection (mean rank = 284), and selfefficacy (mean rank = 279), $ps \le .001$. The difference between medium and low experience levels was nonsignificant in learning gains (mean rank = 340), evaluative judgement (mean rank = 324), self-regulated learning (mean rank = 357) and satisfaction (mean rank = 327).



Note. L, M and H represent low, medium, and high, respectively. $^{**}p < .01, ^{***}p < .001$

Figure 5. Mean ranks of Students' Self-Reported Gains Disaggregated by Prior Co-Creation Experience

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Discussion

In this study, we sought to explore how student and staff partnerships could unfold at scale. In doing so, we recognised that the partnership experience itself would not resemble the traditional dyad structure of a student working closely alongside a member of staff. However, leveraging the available and innovative technology to co-create learning resources (i.e., RiPPLE), our 'partnership' approach still met many of the key facets of what constitutes this increasingly celebrated practice: it recognised the benefits of students' lived experiences, supported reciprocal learning, engaged with uncertain outcomes, and created a mechanism for new and continued dialogue. And most important of all - our findings also showed that the scaled approach aligned to many of the evidenced benefits of partnership, including that of students' learning gains, evaluative judgement and self-regulation. These findings provide compelling evidence for educators and researchers to broaden their scope of partnership activities to support a greater number of students to reap the benefits of partnership.

However, we also acknowledge that our scaled approach to student-staff partnership did not achieve all of the benefits of a more exclusive, relational program or intervention. For example, while students mostly agreed that RiPPLE supported stronger peer and teacher connections, these were still less pronounced than other benefits. In fact, one of the realisations of this finding may be that with scale, comes compromise on the relational benefits of partnership. This further suggests that scaled approaches should not entirely replace the more exclusive, small group, relational partnership practices, but rather complement them in a wider ecosystem of active student learning opportunities (Cook-Sather, Bovill & Felten, 2014). For example, this could align to our additional findings from this study that students who had prior experiences of co-creating learning resources reported greater benefits from the experience. In light of this, universities could consider course-wide approaches to student and staff partnership that scaffold partnership experiences across the student journey, with each iteration supporting students to have more agency over their learning experiences (e.g., Shaw et al., 2017).

We also explored the question of whether students' perceptions of who is responsible for creating learning resources had an influence on their self-reported benefits. Yet our results here were mixed. This could mean two things, first, perhaps a different, potentially more qualitative approach is needed to unpack the influence of students' perceptions on educational responsibilities, or that this previously cited factor may not be as relevant as once thought. Perhaps even students who initially are not open towards the idea of giving more teaching responsibility to their peers or themselves, once engaged, still find benefit in the practice. Either way, this aspect of partnership merits further investigation as it is important that the pedagogies we introduce in the classroom continue to recognise the diversity of the students we teach. In other words, there is no 'one size fits all' approach in any intervention.

One aspect of this study further worth discussing is the constraints and complexities across terminologies used in this space. Even as we designed this study, for example, we struggled with various and overlapping terms of 'partnership', 'co-creation', and 'collaborative learning'. While we recognise these terms are theoretically distinct and have been discussed in the literature as unique (Bovill, 2020; Dollinger & Mercer-Mapstone, 2019; Matthews & Dollinger, 2023), in practice these distinctions often blur, confusing not only educators and researchers, but likely, our students. Therefore, while we advocate for continued conceptualisation rigour to use these terms appropriately (and distinctly), we also caution against such rigour preventing the various discourses from learning from one another and informing the greater goal of supporting student agency in their learning.

Finally, arising from our study are many potentially ripe areas for future research in the space. This includes a clear provocation for educators, scholars, and third-space workers to continue to explore how student and staff partnerships can be scaled and include a greater number of students. As we discussed, one potential route for this is through the co-creation of learning resources, and yet this is by no means the only option the field could explore. Alternatives, for example, might extend to supporting students as co-teachers to their peers, or students as mentors or consultants (e.g., Cook-Sather, 2023; Dollinger & Hanna, 2024). Scaled

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approaches should also consider the areas of feedback and assessment (Cook-Sather et al., 2023), especially as the importance of 'evaluative judgement' or a student's ability to judge the quality of work, is increasingly recognised (Fischer et al., 2024). To this end, our contribution here of an empirically grounded survey on the benefits of partnership may be particularly useful, both to support future evaluations, but also to showcase how future studies could focus on how the various interventions fulfil the benefits of partnership. This shifts the emphasis away from the nuances of the partnership design itself (of which there are so many possibilities) and instead takes a 'what works', practical approach.

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Navigating the Terrain:

Emerging Frontiers in Learning Spaces, Pedagogies, and Technologies

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