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Article

Learning Futures Studies Collaboratively

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Abstract

Collaborative learning strategies have positively affected learning outcomes at different levels of education from kindergarten to college. This study demonstrates the successful application of collaborative learning in teaching futures studies to two cohorts of undergraduate students over two semesters at Tamkang University. The article outlines the structure of the course, which embraced the principles of collaboratively learning in an attempt to engage active participation in thinking about the future. Students' learning experiences are thematically explored and evidence shows positive interdependence was produced by groups working on analysis based on futures methodologies supported by Miro, an online collaborative whiteboard. An instructional outcomes framework for collaborative learning for futures studies emerges from the findings. The concluding discussion is structured using causal layered analysis, allowing for deeper insights into the underlying issues of student learning as well as solutions for possible problems.

Keywords

Futures Studies, Collaborative Learning, Positive Interdependence, Learner Independence, Causal Layered Analysis.

Introduction

Early advocates, including Kauffman (1976), Dator (1986), Slaughter (1992), Bell (1997), among others, emphasised the importance of education in how to think about the future, and the need to start this "from a very early age in children…" Masini (1993, 2011). But, at Tamkang University, futures studies courses have not quite received the level of attention or interest that educators had hoped for over the many years since their inception (Chen & Hoffman, 2017). Responding to this issue, it was decided particular attention needed to be given to course structure in an attempt to engage student interest and build motivation to learn the subject. This study explores the structuring of a futures studies course as a collaborative learning environment, seeking to address some of the challenges of academic boredom and unproductive learning habits in classrooms, by examining the resulting instructional outcomes as informed by reported student learning experiences. Futures studies could benefit from learning activities where collaboration is central, as 'the future' is foggy, no student individually commands clear insight into the future, working together reduces the blind spots of individuals and together, the sum of all efforts is greater than any individual futures knowing efforts.

Teaching Futures Studies

Toffler (1974), Kauffman (1976), and Masini (1993), among others, advocate for the need for futures studies to be embedded in school curricula as we navigate a rapidly changing environment. "Modern society must include people as active, purposeful, and innovative beings whose future oriented behaviour helps create not only their own future but also the social order itself. .. and futures studies can help people create their desirable future more responsibly" (Bell, 1998, p325).

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"How well does our education prepare our students for the world they will live in?" (Kauffman, 1976, p3). As educators we are concerned with these questions — Does education teach students the skills to think about the future? How do we teach futures studies more effectively?

Despite the fact that futures studies is offered as a general elective course (being open and available to all), students at Tamkang University have historically not been very interested in taking it (Chen & Hoffman, 2017). Many see it as unrelated to their majors and/or unimportant when compared to Computer Science, Statistics, Aerospace Engineering, or Financial Management. A good proportion of those who have enrolled in the course have done so to meet minimum credit-hour requirements rather than because of a genuine interest in learning about the subject. In an attempt to energise and activate learning interest, the study explores collaborative learning as a means to do this, by examining its instructional outcomes.

Collaborative learning strategies work well for futures studies as the subject is highly conceptual, perceptual, and foggy, more descriptive than prescriptive, and premised on students having some level of critical thinking for the analysis and application of concepts (Van Boxtel et al., 2000; Linton et al., 2014). Such learning can be arduous for students who are used to being asked to find an exact answer to the question, 'what is' rather than to explore and learn about the questions, 'what's there' and 'what if'. So, the strategy of getting students working in smaller groups where they can research, analyse, explore and discuss issues together makes learning futures studies something more do-able and possibly, fun.

Collaborative Learning

Creating and designing effective learning environments has become urgent in recent years as academic boredom continues to plague classrooms. Students manifest a lack of interest in class, show signs of being disengaged, or adopt a policy of non-participation or worse, resistance to learning. This behaviour is felt to be exacerbated by the many years of student learning that are purely competency-based, and the sidelining of the curriculum theory of Maxine Greene (1971, p253) where education should offer the student the possibility of them as an existing person [to make] sense of his own life-world occasions for ordering the materials of that world for imposing 'configurations' by means of experiences and perspectives made available for personally conducted cognitive action.

Lengthy lectures create academic boredom, and the new cohort of students is more likely to respond to short lectures, i.e quicker and shorter bursts of information before class activities (Fisch, 2010). Sweet (2014) argues that learning spaces ought to be more learner-centric and lean towards a more contemporary social, conversational and constructive process style (with forums, workshops and flipped classrooms), while noting that the role of educators has changed from 'chalk and talk' to facilitating discussions and coaching. Meanwhile, the advancement of technology supporting learning processes and environments has developed far beyond what traditional classrooms or teaching approaches could provide. This proposition can and should drive the need to experiment with the context and the process within which students learn.

There is a considerable amount of research on collaborative learning at different levels of education including primary, secondary and higher, and there is evidence that collaborative learning strategies are successful in achieving better learning outcomes because of positive interdependence (Slavin, 1990, Johnson & Johnson, 1999, 2009; Gully et al., 2002).

From the author's past experience, students prefer individual forms of learning (Raidal and Volet, 2009) and are generally hesitant about participating in group work due to the presence of 'free-riders' or interpersonal conflict Livingstone and Lynch (2000). But for collaborative learning to be effective, in addition to students working in groups, group tasks must also be challenging, open and complex requiring students to create something new and original, in a space allowing for student autonomy and self-regulatory behaviour (Scager, et al., 2016). There is evidence that students learn better when they work together in small groups towards a common goal (Goodnough, 2005) to e.g., reach a position on an issue or complete a project, collaborating through the various phases of 'planning, reflection, and action' as they explore and make sense of the issue or project; because it fosters positive learning interdependence (Scager, et al., 2016), learner independence (Johnson, et al., 1981, Slavin, 1989, Totten, et al., 1991, Lee & Smagnorinski, 2000) and interpersonal & social skills (Johnson & Johnson, 1986).

The proposed learning environment is informed by collaborative learning principles based on the theories of John Dewey (2009), Lev Vygotsky (1980) and Benjamin Bloom et al., (1956) in which student social activities, and teacher-student and student-student interactions promote the engagement essential for learning (Volet et al., 2009).

Methodology

Participants

The study was implemented in Futures Studies in Society, an undergraduate general elective course conducted twice over two semesters in 2021 at Tamkang University. Over the period, the course was attended by a total of 144 undergraduate students from a variety of majors. Each of these semesters was comprised of 18 weeks with a 110-minute period each week. The course being a general elective course, it had quite a high proportion of students who were not exactly interested or motivated to learn or gain knowledge about futures studies as the subject was deemed less important than the core courses of their majors. Similar concerns were expressed by Chen and Hoffman (2017) when they introduced futures games to excite an interest in learning.

In addition to the lack of interest, there were three other major challenges in teaching futures studies to these cohorts: (i) the medium of instruction for the course was English, which amplified the level of difficulty for the majority of Taiwanese and Japanese students of the content taught; (ii) the reluctance of individuals to voice any opinion or say anything aloud in front of the class for fear of making a mistake, being regarded as an exhibitionist, or being disrespectful, as questioning or talking back is considered to be challenging the authority of the teacher. As a result, Asian students tend to be passive learners (Loh and Teo, 2017). Such students constituted the majority of the class, dictating its pace and energy level; and (iii) possible dissatisfaction with the structuring of the course requiring sustained attention and effort throughout the 16-18 weeks of instruction, which was deemed to be demanding, rather than having to only focus and study at two points in time, that is for the mid-term and final exams.

Collaborative learning is not only about students working in groups. Not all group work is automatically collaborative. The group activities, assignments and process for the course were designed with the purpose of ensuring that students were working collaboratively throughout the semester. The design of the activities also took into consideration that English was not their first language and that Asian students are shy and self-conscious and would prefer not to be put on the spot by being asked to speak up in class in front of their peers.

In the traditional classroom learning group setting, students are assigned to work together on assignments that were structured in such a way that they are evaluated and rewarded as individuals for the work of the group and not for the work they contributed as members of the group. Generally, in group work, the more hardworking and conscientious students can be expected to resent such workgroup arrangements as they have to put up with free-riders and delays and endure stressful arguments with group mates. They know that they could perform better if they were working alone. This study set out to address that problem through the design of its activities and course work; and by the teacher, in the role of facilitator, constantly reminding students to maintain and sustain a level of effort all through the semester.

The basic elements of collaborative learning, as prescribed by Johnson & Johnson, (1999) informed the design of the course activities, assignments, and end-of-semester project of the study. The course was structured to encourage socialisation of learning and peer-to-peer engagement, and this would not be accomplished by tasks divisible among group members for individual completion. The proposition of this study was the notion that learning of futures studies can be enhanced by students working collaboratively on projects and activities through the bouncing-off and explaining of ideas to each other (Veenman et al., 2000), including by argumentation with peers (Teasley, 1995; Chinn et al., 2000) in bringing together many perspectives to solve a problem, sharing experience as sources of inspiration, and most importantly, incorporating and building on each other's ideas for activity or project completion. In these student-driven activities, the role of the teacher shifts from being 'the sage on the stage' to facilitator of discussion and learning (Kirschner, 2001).

An online collaborative platform, Miro was introduced to facilitate teaching strategies and as a student learning platform reaching out for active interaction and engagement with the intention of breaking with the academic boredom of the conventional lecture space.

Miro (i) encourages brainstorming where students have the option of not standing or speaking out in class and so avoid being put on the spot. Students shared ideas and were inspired by the ideas contributed by their peers; and (ii) allows for mistakes to be forgotten (via an undo eraser button) instead of being harnessed to the inclination to perfectionism and getting things right. Students were encouraged to examine their actions and decisions as they worked with their teammates - providing space for individual thinking, learner independence and self-expression. The activities were designed to encourage 'doing' something with short bursts of information they had received, and while working on the activity they made sense of the information and learned to apply it to the situation or context provided by each activity. As they had to complete a complex task, they discussed and exchanged thoughts and ideas with their teammates - an opportunity to learn from their peers.

Course description

The course components, listed below, were mainly informed by Jim Dator's Paradigms of Futures Studies for the University Curriculum (1998) and the Six Pillars Framework (Inayatullah, 2008). The components were delivered in the following sequence:

1. Introducing the fundamentals and principles of futures studies (Bengston, 2018; Inayatullah 2008), theory of social change and cyclical theory (Ibn Khaldun, 2005) and systems thinking and behaviour (Kauffman, 1980; Kim, 1999; Ackoff, 2004).
2. Introducing the trends and horizon scanning for driving forces of change and a better understanding of trends and emerging issues facing the society.
3. Introducing the S-Curve (Molitor, 2003) in analysing the evolution of phenomena over time - e.g. The use of plastics for packaging.
4. Introducing the Futures Wheel (Glenn, 1972) in analysing the impacts and implications of emerging issues arising from trends and change facing the community.
5. The identification of issues and developing a focal question for the end-of-course project based on the trends and horizon scanning exercise.
6. Introducing the Futures Triangle (Inayatullah, 2008) for thinking about preferred futures and shaping plausible futures.
7. Introducing the Four Alternative Futures (Dator, 2009)— students were guided, writing narratives for each of the four future archetypes for their selected focal question for the year 2050.
8. Based on one of the selected scenarios, students were to create a model /an artefact representing solution(s) and prepare an image of the future in the form of a poster.

An Example of Use of Collaborative Learning for Teaching a New Concept

The use of collaborative learning for the Futures Wheel

The class begins with a lecture on trends and their associated emerging issues. Localised examples of trends are used in class such as Pets in prams: Falling birthrates in Taiwan, Over-use of plastics in takeaway meals, Online learning in universities, Wellbeing of home-care workers, Silver society wellbeing, Teens and social media, and Mental health of students. Students working in groups of six are asked to pick a topic for their group, and to ponder some of the emerging issues associated with each selected topic. Every student is to contribute at least one emerging issue. They have 5 minutes to do that. They then pull together all the six ideas, discuss how those ideas could come together or if they could not, how they are distinct. They are to agree on one emerging issue for their assignment.

In the next 10 minutes, the lecturer explains how the Futures Wheel can be used to uncover the layers of impacts and consequences of an emerging issue over time. Using one emerging issue from the topics presented, for example, more trees are chopped down to produce paper, the lecturer demonstrates how to use the Futures Wheel for analysis presented on Miro, see Figure 1. To begin, the emerging issue is placed in the centre. The immediate effects felt

form the first order impacts and are detailed. The consequences of the first order impacts form the second order, and the consequences of the second order impacts in turn form the third order. After the explanation and demonstration of how the Futures Wheel works, students are guided, learning how to write a short description of their idea that makes sense using 6 to 8 words on a sticky note rather than trying to make do with just one or two words. Students, within their group, begin an analysis of the impacts and consequences of their selected emerging issue. The groups have 35-40 mins to complete the three-order impact analysis.

Each group is given a 18" X 24" piece of poster paper, three sticky notes pads of different colours - one colour for each order impact, and a pack of 6 multicoloured Sharpie permanent ink markers. Each student is to contribute at least one first order impact, one impact on one sticky note, positioned around the emerging issue. As soon as everyone has contributed to the first order, members of the group read and review each sticky note to clarify meanings, re-writing or re-phrasing for clarity when required. This process demonstrates peer learning works best when group members encourage each other's participation, contributing ideas, supporting each other's understanding and summarising collectively. This process was repeated until the three-order impacts are completed.

While students work in their groups, the lecturer floats around, facilitating discussions and providing explanations and assistance when students are stuck with their analysis or require some clarification. At the end of the 40 minutes, the groups take turns to report back using their Futures Wheel posters. As they report back, each group is quizzed on what they have learned from the exercise, how they used the Futures Wheel and what they have learned working as a group. To complete the assignment, each student is required to write a 200-word reflection essay on the exercise.

The initial plan was for class activities to be completed using the online collaborative whiteboard, Miro, where students can work independently, individually and collaboratively as a group, in real time, in the same space at the same time. Miro has the essentials to allow this, with sticky notes, text writing, a draw function for diagrams, and an undo button for corrections, all supporting the above forms of student interaction. However, continuing this initiative proved to be a challenge as only a handful of students were willing to bring their laptops to class. The class activities for the first 10 weeks were shifted to being paper based so that every student could participate and benefit from the lessons. Students were required to use Miro to complete their end-of-course projects.

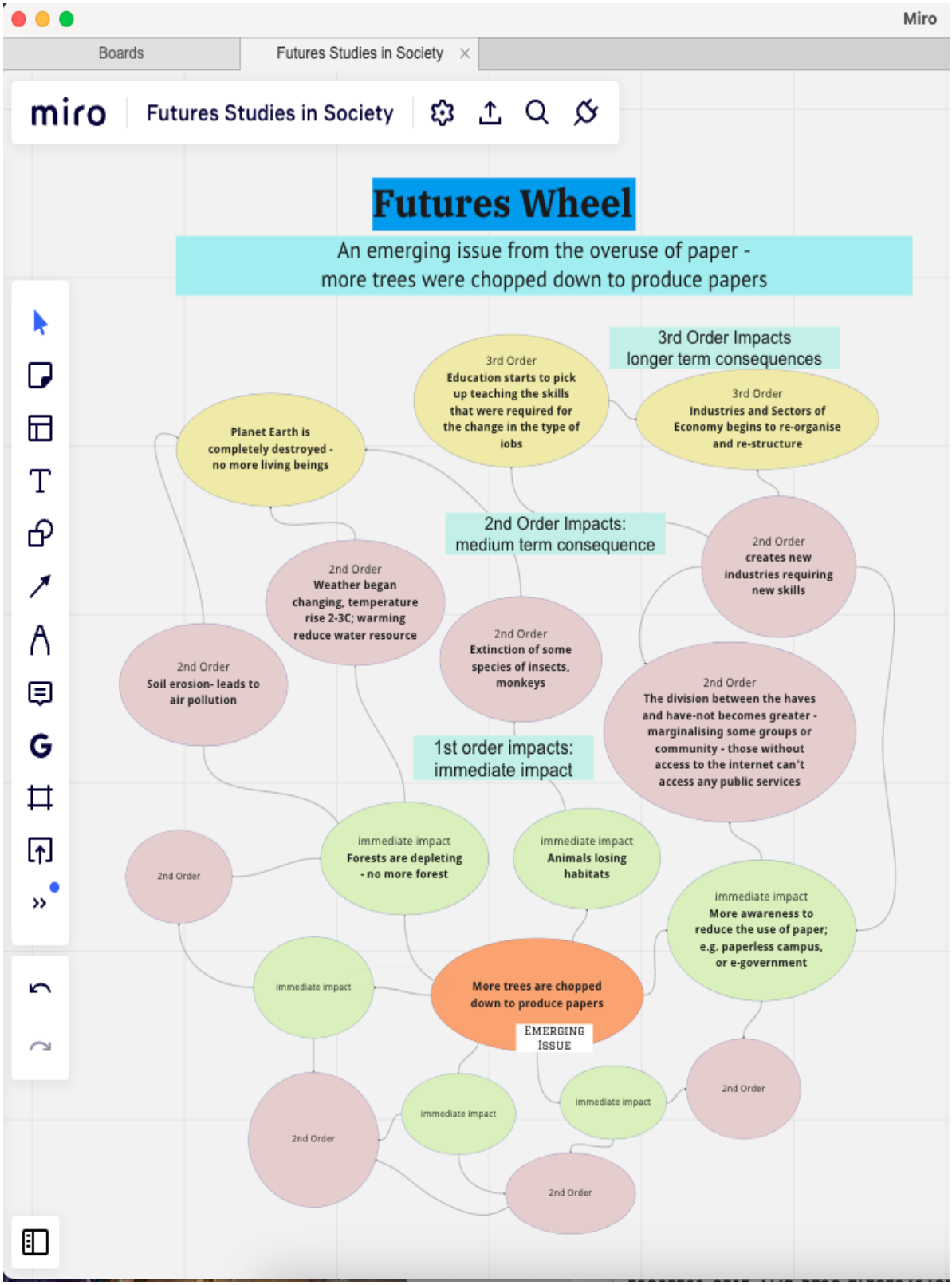

Fig 1: Explaining the Futures Wheel using MIRO

Tool Design and Data Collection

A survey questionnaire was designed to capture student feedback about their learning experience. The survey was distributed to students at the end of the semester upon course completion.

The survey consisted of four main sections with a total of 18 questions comprising both 5-point Likert scale and semi-structured question types. Table 1 presents the four sections in the survey questionnaire: (i) Awareness of Futures Studies and Thoughts about the Future, (ii) Group discussions & working collaboratively, (iii) Using Miro for learning, and (iv) What works for learning. Table 2 details the questions within each section. The 5-point Likert scale items assessed trends and patterns in learning outcomes, while the semi-structured questions elicited deeper insights from students into their learning experience.

Table 1: Tool design: Survey sections and type of questions

Section	Category	Number of Questions / Likert scale or semi-structured
1	Awareness of Futures Studies and Thoughts about the Future	5 questions on a 5-point Likert scale 1 question, semi-structured
2	Group discussions & working collaboratively	3 questions on a 5-point Likert Scale 1 question, semi-structured
3	Using Miro for Learning	1 question on a 5-point Likert Scale 3 questions, semi-structured
4	What works for learning	1 question on a 5-point Likert Scale 3 questions, semi- structured

Table 2: Tool design: Questions in each survey section

Section 1	Awareness of Futures Studies and Thoughts about the Future
	How much did you know about future studies BEFORE this course? How much do you know about future studies AFTER this course? Did the class affect how you think about the future? How do you feel about the future after completing the course? What helped you understand Future Studies in class? *Explain the way you feel about the future. Why?
Section 2	Group discussions & working collaboratively
	*Were group discussions helpful for learning? Describe your experience. Did the group discussions give you a chance to express your views or opinions? Was having time in class for activities and group discussion useful? *Explain in greater detail why having (or NOT having) a chance to state your views or opinions was important to you.
Section 3	Using Miro for Learning
	Did the use of Miro help you express your views or ideas better? *Explain in greater detail how using Miro helped you express your ideas or views. *Explain in greater detail how using Miro helped you work as a team *Explain in greater detail how using Miro helped you complete your project.
Section 4	What works for learning
	Did the class activities help you better understand what's happening around you? *Explain in greater detail how the class helped you think better. *Explain in greater detail how having time in class for activities and discussion was useful to you. *What, from the course, was most useful to you? Why?
* Denotes semi-structured questions capturing rich insights into student learning experience (qualitative data)	

Analysis Strategies and Procedures

Data collected from the survey were analysed and frequencies tabulated to understand patterns of practice, student engagement and learning. The responses from the semi-structured questions were analysed in four stages in the process of which key themes emerged as the major findings of the survey.

Step 1: Record qualitative responses from the survey. Survey responses were recorded using sticky notes on Miro - one viewpoint/idea, one sticky note. The process was repeated until all the responses (data) were completely recorded.

Step 2: Cluster responses that are similar in nature. Responses that were similar in nature were moved into the same space to form a cluster.

Step 3: Merge clusters of similar nature. The responses in each cluster were read and re-read; if two or more clusters were similar in nature, they were merged as one.

Step 4: Write a short description that succinctly explains the core ideas in each merged cluster. A title is then given to that description - now labelled as a Key Theme.

Findings

Part A of the findings reports on the quantitative survey questions, with frequencies presented in bar charts so that the patterns of practice, student engagement and learning can be better understood. Part B focuses on two parts of the set of qualitative data collected with the semi-structured questions; (i) factors contributing to effective collaborative learning; and (ii) the use of Miro for collaborative learning.

Part A: Patterns of Practice, Student Engagement and Learning Outcomes

Level of Awareness about Futures Studies Upon Completion of the Course

Students were asked about their level of awareness of Futures Studies, using a 5-point Likert scale: 1 being not aware at all, 2 - somewhat aware, 3 - moderately aware, 4 - aware and 5 - highly aware.

Chart 1 shows that 88.9% (128 out of 144) of the students came into the course with some level of awareness (at least a rating of 2 on the 5-point scale) about Futures Studies with 30% (29 + 14 students) indicating an awareness level of aware or highly aware - rated at 4 and above.

Chart 2 shows the level of awareness of Futures Studies after the class. Frequencies were skewed to the right with 99.3% [143 out of 144] of the students feeling that they were more aware of Futures Studies after taking the course. A majority of 89.6% (85 + 44) of the students rated their awareness at 4 or above.

A comparison of the two charts (Charts 1 & 2) shows an increase in ratings of 4 and above from 30% to 89.6%, and an absence of ratings of 1 (not aware at all about Futures Studies), which together demonstrate a positive learning outcome from the semester of Futures Studies in this study.

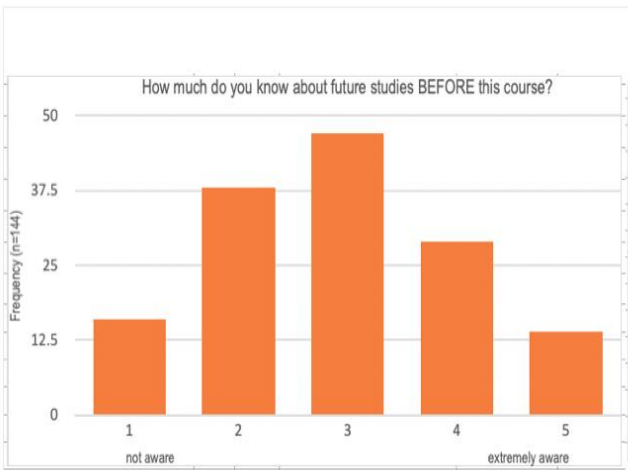

Chart 1: Awareness about Futures Studies Before the Course

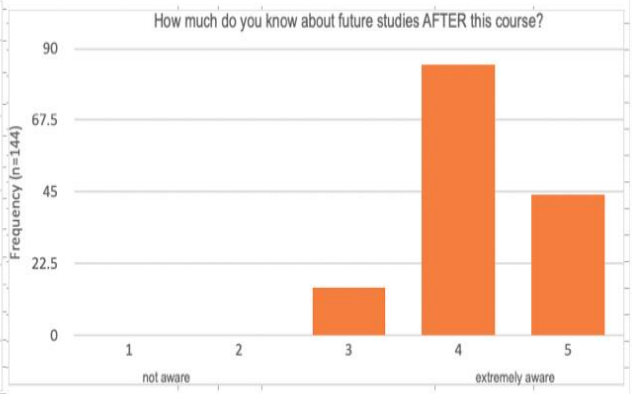

Chart 2: Awareness about Futures Studies After the Course

Futures Thinking

Students were asked if the course had influenced the way they think of the future (Chart 3 -using a 5-point Likert scale: 1 not at all influenced, 2 - somewhat influenced, 3 - moderately influenced, 4 - influenced, 5 - highly influenced) and how they felt about the future upon completing the course (Chart 4 - using a 5-point Likert scale: 1 being extremely negatively, 2 - negatively, 3 - neutrally, 4 - positively, 5 – extremely positively.

Chart 3 shows many of the students [98.6%, 142 out of 144] in the class felt that the course affected how they think about the future. This result is encouraging as it shows that the course had an impact on their thoughts about the future.

And those thoughts about the future are positive rather than negative - Chart 4 shows 94.4% (136 of 144) students felt positively (rating 3 & above) about the future after the completion of the course.

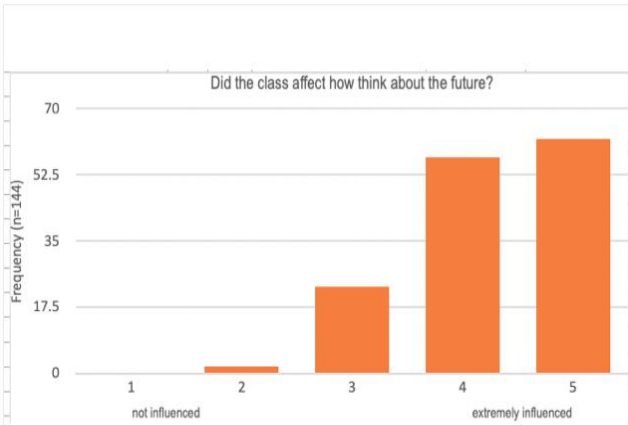

Chart 3: Did the class influence how you think about the future?

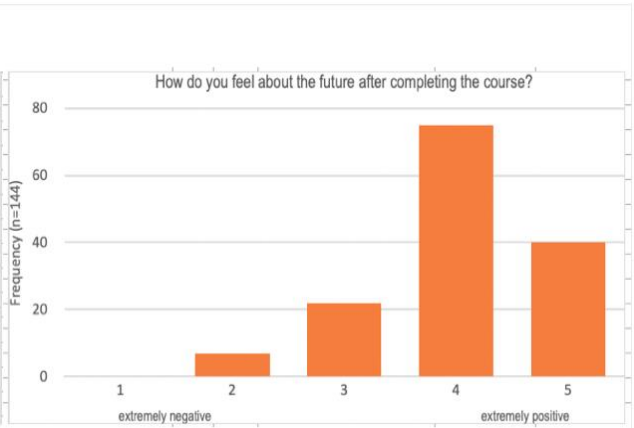

Chart 4: How do you feel about the future after completing the course?

Overall, Charts 1-4 indicate positive learning outcomes derived from the course. From their comments, we can see students learned to apply futures methodologies for more structured and organised thinking about the future; they had developed an ability to think about their personal futures; they were prompted to use their imaginations to think creatively and create alternative possible futures; they realised the need to think about the future of society and their communities; and they had become more aware of what was happening around them. [Refer to Table 3, Key Theme 5].

Following are representative quotes from student responses:

> "I get in touch with a lot of social issues happening in our society, which is so important for us to have an imagination of our future."
>
> "It helped me to put more thought into how everyone in society can shape the future. Small steps are important to achieve better future."
>
> "It helped me be a lot more analytic and critical of what is happening in current society because it will play a role in my future."
>
> "… the material helped me create a vision about a future that I had not thought before."
>
> "For me this course has helped me think deeper and to think about the future, because the actions I do today will affect the future."

Class Activities and Group Discussions

Many students, 90.2% (130* of 144) indicated that the class activities promoted a greater awareness of their surroundings, (See Chart 5). Students worked in groups of six, conducting analyses using STEEP, the S-Curve, and the Futures Wheel. These analyses were conceptual in nature, requiring higher-level reasoning and critical thinking abilities, and were structured in ways that necessitated student engagement in cooperative 'all hands on deck' work to complete the task. The lecturer floated around the groups, facilitating discussions, answering, and clarifying 'how-to's, and urging them to complete each task within the allotted time period. Eighty-one percent (117* of 144) of students indicated that having time for discussion in class was useful (See Chart 6). The corresponding figure for the question, whether group discussions while working on analyses helped with thinking, was 81.9% (118* of 144, refer to Chart 7); while that for the question, whether working in a smaller group removed a barrier to class participation, by creating a safe space for self-expression for the shy Taiwanese student afraid of speaking up in front of the entire class, was 87.5% (126* of 144, refer to Chart 8. [* responses with ratings of 4 or 5 for the corresponding question].

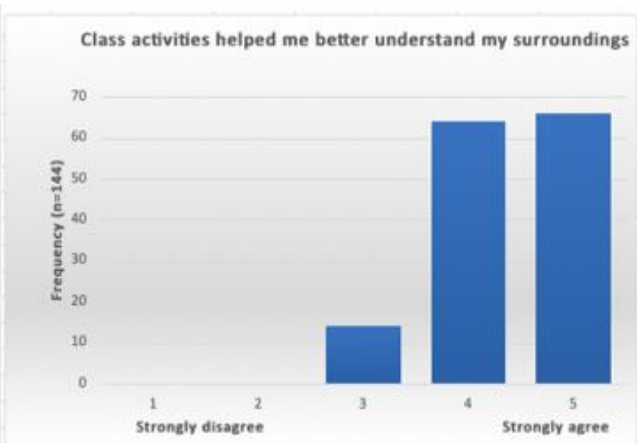

Chart 5: Class Activities Promote Awareness of Surroundings

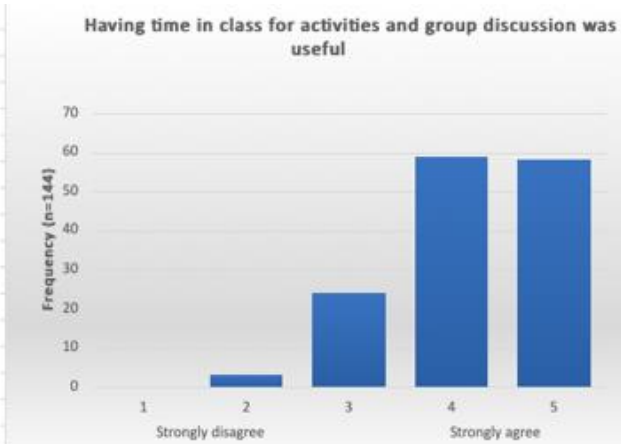

Chart 6: Having Time for Group Discussion in Class

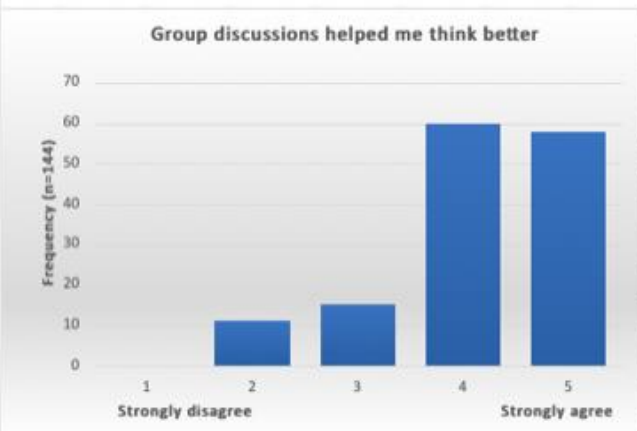

Chart 7: Group Discussions Helped Thinking

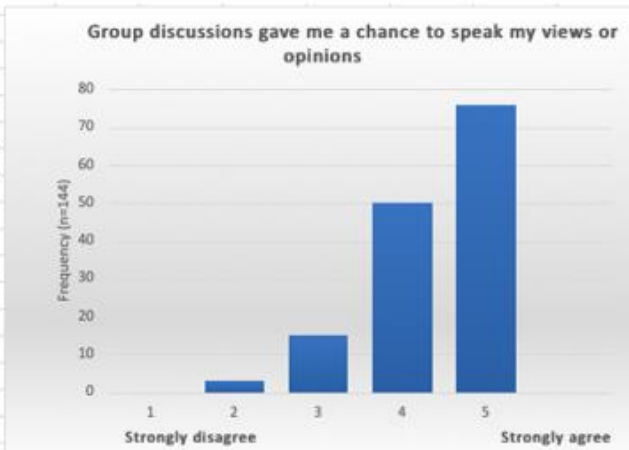

Chart 8: Group Discussions Allow Self Expression

Representative quotes from student responses:

> "It helps me to share my thinking with others, and helps me to know how different other people think of the incidents."
>
> "Allowed me to understand about other people's perspective as well and compare it to my own, which was quite useful as I was able to see from a different point of view."
>
> "Chance for someone to be against me or have another opinion. These opinions help me learn to look at the same issue in different perspectives."
>
> "I want it so badly to share with everyone, I want them to see from my perspectives, understanding what I'm trying to say."
>
> "The true meaning of thinking. Before we study in college, we didn't have many chances to think about the things around us, but I learned how to think deeper and wider through this course."
>
> "To me, it is important for me to speak out what I'm thinking, so that it can improve the way I think because I usually follow others 'opinions."

Students were required to use Miro as a working space where their thinking could be viewed by others. Eighty-four percent (121 of 144 with ratings 4 and 5) of students felt that Miro made self-expression easier by giving them the opportunity to write independently, share and discuss their ideas and opinions while remaining within their comfort zone with a smaller group of familiar faces (see Chart 9). This approach allowed shy students, who were normally side-lined when working alongside their more confident peers, to participate more equally in discussions.

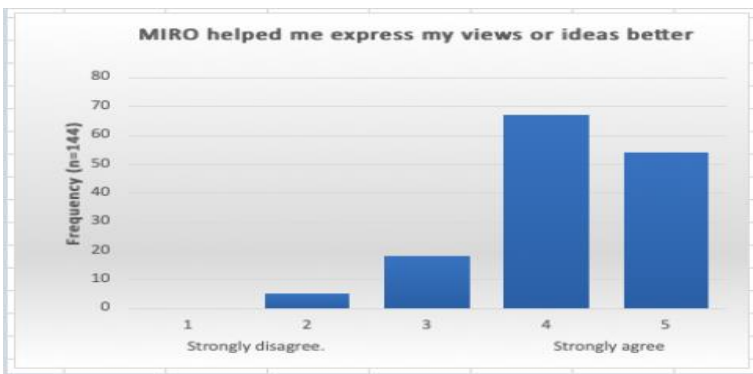

Chart 9: MIRO for Self Expression

Using Miro for Learning

From the feedback, students found Miro useful for three main reasons. It facilitated:

1. on an individual level self-expression,
2. on a group level working collaboratively as a team; and
3. overall, the completion of their course final project.

On An Individual Level for Self-Expression

A majority felt that Miro created a space where self-expression was possible. It was a safe place for communicating

without physical interaction but also a place where they could look for inspiration from their exposure to the perspectives of those around them. Furthermore, for those who had trouble expressing themselves face-to-face in English or just in general, they could use the tools and functions to represent their ideas through images and videos. Miro provided a space with unlimited opportunities for experimentation but one where introverts could be safe, facilitating collaborative learning, and making it easy for students to connect the dots and analyse what was going on in the class on an individual level.

> "…encouraged me to express my ideas and be creative as in Miro I am able to put out all of the ideas that i have in mind randomly and compile them in the end."
>
> "I expressed our ideas with texts, notes, patterns, images and artefacts. I connected everything together with design, not just boring paperwork anymore!"
>
> "We could ask every teammate to join at the same time so we could see a clear progress in our project after every connections, … enable us to work from home and not only when we were in class"
>
> "The biggest thing was to be able to access it from our own devices and working on one board together, so we could finish it from our home at any time without the need of meeting up."

On A Group Level for Working Collaboratively as a Team

One of the main reasons for introducing Miro for the course was to foster collaborative learning within groups as well as the entire class. The platform provides a general accessible space where students can share ideas, edit group work in real time, and get inspiration from other groups.

Following are verbatim quotes from students about within- and between-group interaction:

> "We can see who already finished their part so when you see the others have completed the progress that we should have, it will naturally force you to complete it"
>
> "It syncs all ideas well in any distributed team. For me personally, I think Miro speeds up team collaboration equally. we see who put in effort and who does not."
>
> "Miro is quite convenient because we can do a project at the same time and the design is clear. So I can easily see who is doing which part and which part still needs more members to participate"

On The Completion of Final Course Project

Miro's interface allows students to get a better idea of their progress over time and in turn, develop a clearer picture of their end goal. Students also found reviewing and editing to be quick and efficient. Relevant feedback from students:

> "I can still edit information when I go back home. That is really convenient for me because each member if my team comes from different major, so it would be difficult to finish our work together without Miro."
>
> "As I was busy with classes, Miro allows me to complete my tasks as a group without needing to spare time to meet the other team members, and it is quite convenient as other people are also busy with their own schedules."
>
> "We use Miro to finish the details and discuss how to work together and divide into three part to each

member to finish their project."

Figure 2a and 2b show two examples of group workspaces on Miro demonstrating student group work and process in a project on the use of technology: How future technology can improve quality of life? The Futures Triangle was used to frame the interview questions with three stakeholder groups: namely student, parents and the university. Figure 2a shows Step 1: Data Collection. For the project, every member was required to interview at least three people from each stakeholder group. The information they gathered for each interview question was recorded using sticky notes on Miro, with one statement per sticky note. Students were taught to analyse the data using cluster analysis. The sticky notes could be moved around into clusters for ideas/notes of a similar nature. Students read and reviewed each other's notes to fine-tune the group's output for presentation. Figure 2b shows a completed S-curve analysis with research notes written and placed for each stage of the curve. Students found Miro useful as they could collaborate in work online, in real time. They learned how to learn from and inspire each other, shifting the common learning mindset from a competitive, individualistic, winner-loser one to a communal, participatory, and collaborative one.

Fig 2a: Group workspace – clustering of data.

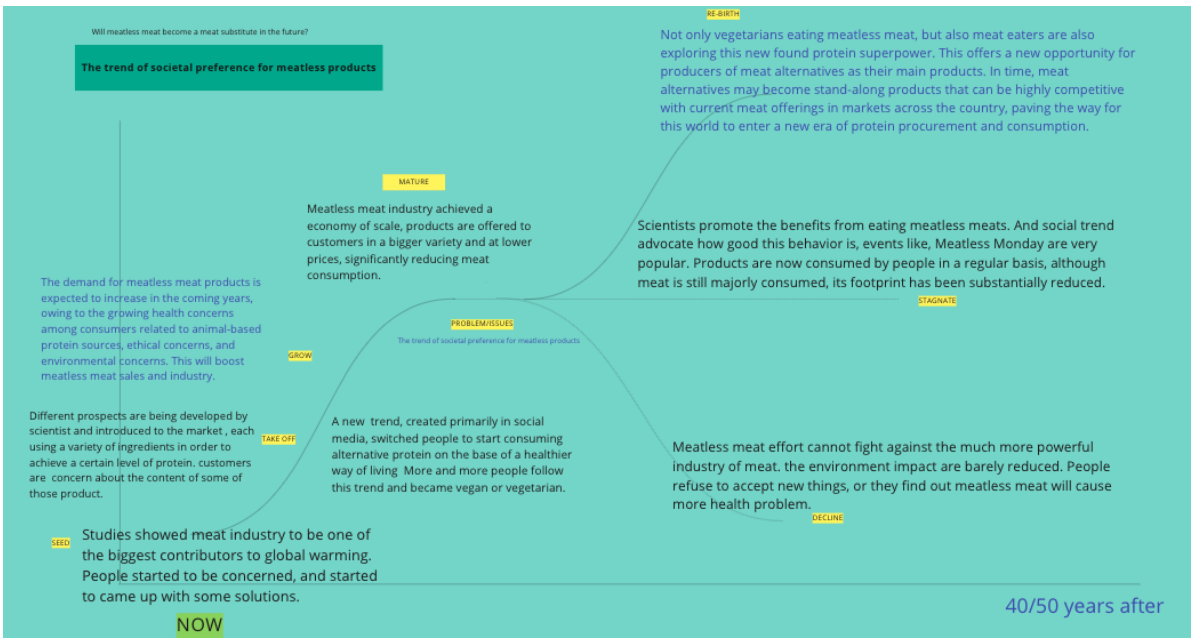

Fig 2b: Group workspace – a completed S-curve.

Part B Outcomes of Collaborative Learning

The following five semi- structured questions in the survey were designed to examine the student learning experience:

- Were group discussions helpful for learning? Describe your experience.
- Explain in greater detail how the class helped you think better.
- Explain in greater detail how having time in class for activities and discussion was useful to you.
- Explain in greater detail how having a chance to share your views/opinion was important to you.
- What, from the course, was most useful to you and why?

The responses consisted of statements with rich insights. Each statement was recorded using a sticky note on Miro for cluster analysis. The statements on all sticky notes were analysed by reading and reviewing their meaning; and sticky notes that were similar in nature were clustered. Statements in each of the resulting clusters were re-read and reviewed and clusters were merged when their themes/ideas appeared to be similar. An example of a cluster forming a theme is presented in Figure 3.

Fig 3: A cluster of responses forming an emerging theme

Five themes emerged from the cluster analysis, namely, peer interaction, peer relationships, team spirit, learner independence, and futures thinking. Table 4 presents these key themes as the instructional outcomes of a collaborative learning approach in futures studies.

In the next section, the emerging key themes and associated codes are described in detail.

Table 4: Outcomes of Collaborative Learning in Futures Studies

	Key Theme 1: Peer Interaction
Codes	Team relationships & Peer interaction- make new friends
	Learn to listen to others
	Learn from peers
	A mind open to different views
	Exchanging ideas with peers
	Broaden perspectives - open to seeing new perspectives
	Inspired by new ideas, build on each other's ideas
	More intensive thinking - think deeper
	Key Theme 2: Peer Relationships
Codes	Learn to respect each other
	Learn to manage conflict

	Learn to trust
	Mutual support and care
	Key Theme 3: Team Spirit
Codes	Work with peers on problem solving
	Ability to self-regulate as a team Team roles and work distribution Completing tasks on time Responsibility for contributions to project completion
	Complementing each other's work
	Key Theme 4: Learner Independence
Codes	An ability to think critically about an issue
	Structured and organised thinking
	An opportunity to think independently rather than being 'spoon-fed' with answers
	An opportunity to contribute ideas
	Helped build confidence in self-expression
	Develop confidence to express ideas in English
	An opportunity to participate in discussion and to contribute ideas
	Key Theme 5: Futures Thinking
Codes	Learn to use futures tools for a more structured understanding of the future
	Think about personal future
	Think about possible, alternative futures
	Being optimistic about the future, not paralysed by anxiety
	Creative thinking using imagination
	Think about the future of society, our community
	An appreciation for what's happening around us

Instructional Outcomes of Collaborative Learning in Futures Studies

The course structured for interdependence shaped the way students interacted with each other, which determined instructional outcomes. These interactions positively affected peer relationships, helped channel efforts to achieve better results and helped learners gain independence (See Figure 4).

Peer interaction

Peer interactions during group work create opportunities for students to promote each other's learning by helping, assisting, supporting, and encouraging each other's efforts towards completing the project. The group discussions provided a space for interactions where students bounced ideas off, learned to listen to, and even argued with each other, incorporating, and building on ideas that were not originally their own. These interactions enabled two components of learning (i) the broadening of perspectives through an encounter with different perspectives, which then led to more intensive thinking; and (ii) the inspiration of new ideas through exchanges.

Peer relationships and team spirit

Peer interactions in turn enabled the forming of positive peer relationships manifested as mutual support and care nurtured over the 18-week semester. This relationship in turn positively moulded greater effort directed towards completing the group project with good grades.

Members of the groups had a mutual goal, which was to complete every class activity and the end-of-course project, and they were motivated to do this well for a good overall grade. Students learned to practice self-discipline when they had to work as a team to complete activities and the project in a timely manner as well as do a good job. They learned to assign and/or volunteer for team roles - organising team meetings, ensuring members contributed, pulling together ideas for analysis of findings and development of solutions and artefacts, and completing displays on Miro board or paper-based posters for reporting back. The weekly group reports back ensured individual accountability for the success of the group. Students also learned to listen and critique while maintaining respect for others' opinions. It was common for students to avoid confrontations while first starting to work as a team, but over time, group members began to develop greater trust in each other and learned to manage conflict in a more productive manner, which in turn resulted in greater mutual support while problem solving and greater contribution by members to development by peers of their ability to work on the project. This demonstrates students had gained inter-personal and small group social skills.

Learner independence

Group member interactions also nurtured learner independence with the opportunities students had to participate in discussions fostering confidence in their powers of self-expression, and their ability to express and contribute ideas in English (considered a challenge as English was not their first language), which in turn shaped their ability to think critically, to better structure and organise their thinking and to work independently rather than be spoon-fed.

Overall students reported they welcomed the opportunity to participate in discussions when they worked in groups. Generally, quieter students are sidelined in full-class discussions because they want to avoid being put in the hotseat, having to speak in front of the entire class. The writing of ideas on sticky notes gave them a 'safe' space to express their ideas, and gain confidence in their powers of self-expression. Having a space to express their ideas in English in a smaller group, the Taiwanese students developed the ability to think critically, structure and organise their thoughts, and think independently rather than be spoon-fed with answers or told what to think.

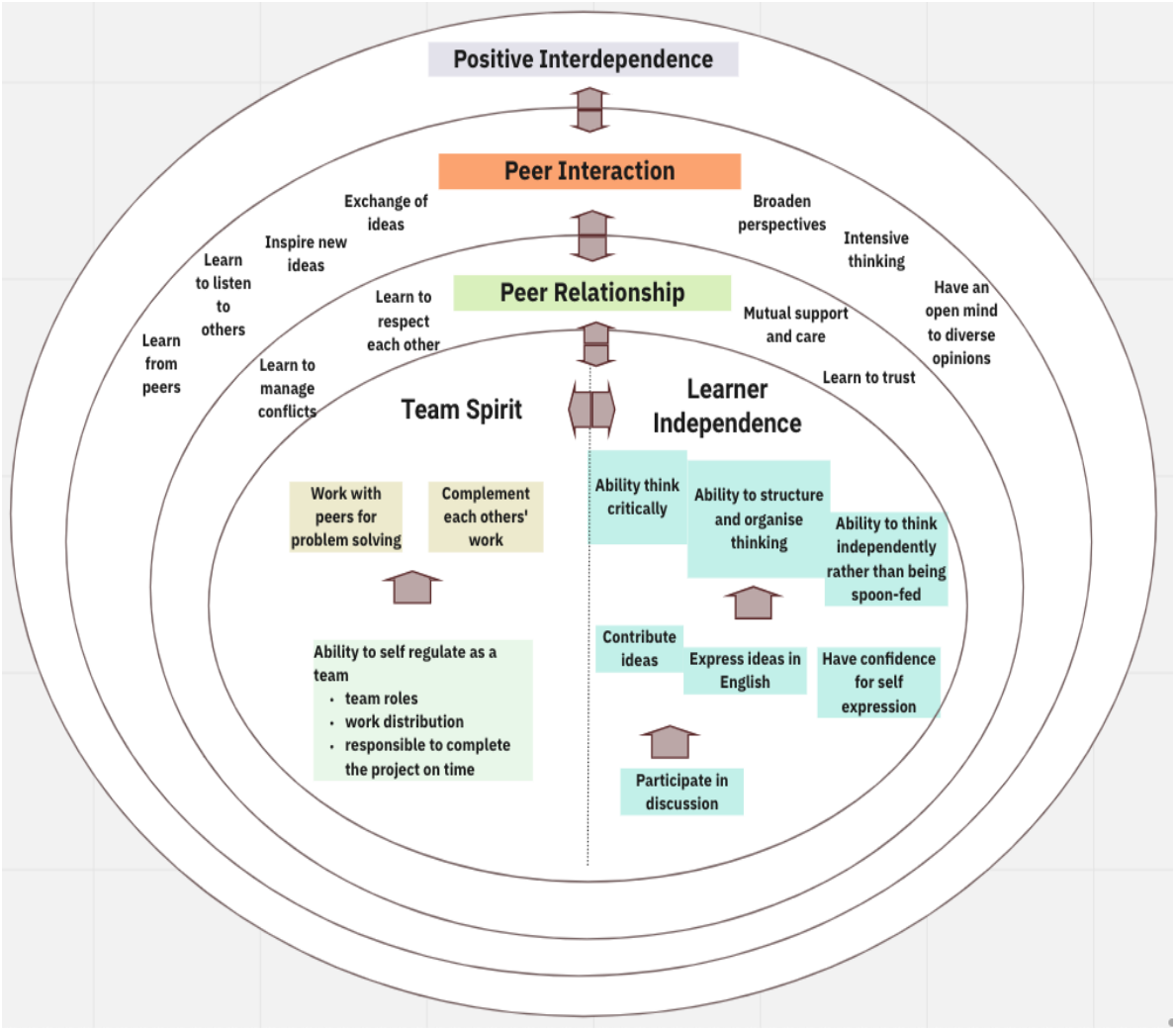

Fig 4: Instructional Outcomes of Collaborative Learning for Futures Studies

Discussion

The value of this study lies in its structuring of the goals, process and outcomes of a futures studies course distinguished by its joint-collaborative learning space on which the results of thinking were made visible to students as they shared both tools (futures methodologies and the use of Miro) and activities while working towards a common goal. Its findings demonstrate the positive student learning experiences theorised by Slavin (1990), Johnson & Johnson (1989,1999, 2009), Volet et al., (2009) and constitute evidence that collaborative learning strategies work for teaching futures studies. The understandings and findings of this study are discussed below using Causal Layered Analysis (Inayatullah, 2008) to tease out the worldview(s) and core metaphors that perpetuate reoccurring learning issues in education, exploring a more transformative narrative.

At the Litany Level

Lectures, a traditional, transmission-based ('sage on stage') approach have been criticised as ineffective because lecturers can have little understanding of what students are making of the content or even if they are making anything of it at all, passive as they are as recipients of knowledge, In addition, lectures necessarily make the assumption that

'one-size fits all' in the learning space (Arvanitakis 2014). In the conventional approach to teaching (of lectures, individual take-home assignments, and a 'make-or-break' final exam), students struggle with exploring and learning the what-ifs and 'foggy', difficult-to-grasp concepts of future studies. Their struggles are made worse by the challenge of a course where English is the medium of instruction. Consequently, students tend to tune-out most weeks in the semester until a few days right before exams.

Litany Level Solutions and Discussion

The findings provide evidence that learning through positive interdependence works when a course is structured so students work collaboratively in small groups supported by lecturer facilitation during class instead of alone on take-home assignments.

The course activities, assignments and project of this study were structured in a sufficiently extensive way that input from each student and an exchange of ideas within the group were required for understanding of the task and its completion. This was by design and was done to avoid task division which could hinder understanding-oriented interaction. The activities were contextualised to bring to the task some level of relevance, an important feature, as established by Scager et al., (2016), as it increased the perceived importance of the course as reflective of the 'real world'. Students soon learned that some of the tasks and stages of the project were best accomplished within the 80 to 100-minute class period, which prompted the need to work more efficiently as a group. They realised that it was difficult to regroup after the class as each had different schedules and they seldom met for other courses. They learned to organise the tasks requiring group discussion and decisions so they could be done during class time and to leave those that could be done independently on Miro for completion outside class. The final grade was made up of two scores; (i) one worth 20 percent of the overall grade awarded to individuals for their contributions to the shared activities of their group; and (ii) the other worth 80 percent awarded for completion of the group project, the common goal of the group. A shared goal strengthens positive interdependence among students (Cohen, 1986). The grading system and course structure required the interactions and interdependence that positively enhance learning (Slavin, 1990, Johnson et al., 2007).

A majority of the Taiwanese and Japanese students felt the course was stressful because English was the medium of instruction. The 'fogginess' of the future and the terms and expressions of futures studies contributed further to their unease. Futures studies was quite baffling for them and difficult to grasp as its terminology does not translate well into Chinese or Japanese. The small groups working together helped solve this problem. They discussed and explained the theories and concepts to each other in a language they were comfortable with and could understand better. This demonstrates peer learning (Vygotsky, 1978) and positive interdependence (Johnson & Johnson 1989).

Working in a smaller group provided a space for self-expression. Many Asian students much prefer not to have to speak in front of the entire class and this teaching strategy worked well in creating a safe space for student expression and exploration of ideas (Cortazzi and Jin, 1996; Littlewood, 2001). Working in smaller groups of familiar faces, students found themselves participating more as they did not have to worry about becoming the focus of attention.

Working collaboratively on Miro allowed them to experiment with ideas, undoing actions and erasing or moving objects around the board in a process of trial and error much more productive than the folly of perfect answers first-time. This was a much-needed approach in the creation of a space for students learning to explore and experiment when throughout their school years they had been punished for the wrong answers. In this exploratory space, they learned how to listen, respect diverse opinions, and be open to different perspectives. These exchanges inspired curiosity and creativity. With these discussions and even with disagreements, students learned to respect each other and to resort to less confrontational ways of managing conflict. Over the semester, the six individuals grew and evolved to become a team where they channeled their energy towards completing the final project in time and doing it well.

At the Systems Level

Why was collaborative learning not straight forward for students at Tamkang University?

First of all, futures studies was not a course of choice for many. Student engagement proved to be a challenge when students could not see the relevance of futures studies to Computer Science, Statistics, or International Relations, or saw its only value as being an elective with which a minimum credit-hour requirement could be met. Beyond the classroom, there is generally a lack of appreciation for the relevance of futures studies and the transferable skills learned from the subject, with the labour market not recognising its value.

Secondly, summative assessment is baked into systems of education from primary school to university with rewards for individual academic performance creating 'cram-everything-in and burn-the-midnight-oil before exams' study habits which reinforce learning-alone strategies.

Proposed Systems Level Solutions

Schools and universities should include futures studies in the main curriculum, communicating the relevance of and skills transferable from the subject. It ought to be taught as a framework for social inquiry rather than just as theories and concepts to be understood and memorised, as Inayatullah (2013) advocates.

Educators can be activists for futures studies, promoting train-the-trainer (futures workshops for teachers) programs in high schools. If more school teachers were futures literate, there would be a better chance of futurising classrooms, and eventually more young people would be equipped with anticipatory skills making them less susceptible to surprises or being paralysed by the future.

Institutionalising 'ungrading' by doing away with summative assessment and conventional grading systems is the step needed to change learning behaviour.

Worldviews

What values permeate teaching practice at Tamkang University?

What values are held by students about learning futures studies and learning in groups?

What are the metaphors for the worldviews which support stakeholders' narratives? How can we change those narratives?

The university administrator worldview: Teachers are respected figures and revered as 'a font of wisdom,' or 'a sage on a stage' and are expected to lecture; students are to listen and learn passively (Loh & Teo, 2017). There is little trust in allowing independent learning and the belief that teachers have the final say as to whether students have learned anything based on exam results is unquestioned.

The general student worldview: High performing students prefer to work alone as they know their work is good and that they do not need to rely on others to learn better. Working in groups means students are assigned to a group, given an assignment, and expected to go away to complete it entirely on their own. Students resort to 'divide and conquer' tactics to efficiently complete assignments, which often results in individual students working in isolation and not learning about the broader issues raised by the assignment, which completely misses the point of making an assignment a group one so students can learn from each other. The metaphor of 'a class of lone super-learners' best illustrates the situation.

A possible transformational narrative for collaborative learning: Teachers as facilitators of learning. Teachers working alongside groups of students to initiate discussion and brainstorming allowing for the exchange of ideas. Giving each student the opportunity to ask and to share ideas in smaller groups. Working in groups allows for the opening-up to and learning from different perspectives. Working together to assist in reducing the blind spots of individuals, in that, the sum of all efforts is greater than any individual futures knowing effort.

The new transformational metaphor could be 'a seed bed of sprouting learners' and the 'teachers as fertilisers' boosting and nurturing elements of differences and multiple intelligences to be appreciated and embraced, because diversity creates the emergence of new and different perspectives much needed to discern and learn about the ever-changing future. Table 5 summarises the worldviews and metaphors of this analysis.

Table 5: Causal Layered Analysis of Collaborative Learning for Futures Studies at Tamkang University		
From 'a class of lone super-learners' to 'a salad bowl of learners'		
University Administrator Worldview	Student Worldview	Transformational Narrative
Teachers know it all. If teachers are not lecturing for the entire110-minute class period, the teachers are lazy.	Working in groups is a waste of time.	Student collaboration, and the peer-to-peer and teacher-student learning process is the social construction of knowledge.
Metaphor: Teachers are the "Sage on Stage"	Metaphor: A class of lone super-learners	Metaphor: A seed bed of sprouting learners Teachers as fertilisers, nurturing and boosting elements of differences and multiple intelligence

Conclusion

The instructional outcomes framework that emerges from this study (Figure 2) agrees with that of Johnson & Johnson (1999) that "the interdependence structured among students determines how they interact with each other and in turn determines instructional outcomes" (p72). In their model (Johnson & Johnson, 1989), there were three broad and interrelated outcomes, namely, effort to achieve, quality of relationships among participants, and participants' psychological adjustment and social competence. The findings from this study reveal that peer interactions and peer relationships facilitated team spirit and learner independence, too. Learner independence appears to be one of the major outcomes from the course as students needed a level of self-confidence to step out of their comfort zone. This demonstrates that through collaboratively structured efforts, students learned to learn more, to think more intensively and expansively, and to build more supportive and positive relationships with a diverse set of peers.

It is a remarkable achievement for a futures studies course through the use of collaborative learning to achieve success in the formidable endeavour of turning around a group of uninterested, unmotivated and unprepared students further handicapped by their lack of language proficiency. And, after the course, students will have had a better appreciation of futures studies by virtue of their rigorous and tireless weeks of work in their groups as well as transferable skills acquired facilitating their undergraduate journeys.

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