



Article

Reevaluating the Foresight Styles Assessment: A Measurement of Futures Competency for University Students

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Abstract

This article analyses the results of a revised foresight styles assessment (FSA) of 1320 students in undergraduate classes at Tamkang University. The modified FSA has been shown to be a reliable tool in measuring the impact of improvements to foresight competency. It found that the educational intervention of students taking futures courses improved the mean score across the five foresight styles investigated: Futurist, Flexist, Activist, Opportunist and Equilibrist. Importantly the findings show that those students who have taken futures courses exhibit a statistically higher value in the Futurist category, those who think in terms of 5-20 years, understand the impact of trends, take a systems thinking approach and facilitate the development of best possible futures (Dian, 2009).

Correlation was also found affecting students' futures competency between factors of gender, involvement in university clubs, and being an international student. Notably for teachers of futures studies and schools wanting to include futures studies, the findings are further empirical proof that futures-oriented pedagogy is a valuable tool to transform the current factory model of learning into a culture of foresight and provide students with essential strategic foresight leadership skills.

Keywords

Foresight styles assessment, Futures competency, University students, Empirical analysis

Introduction

This research is a follow-up evaluation on the futures-course learning outcomes of Tamkang University students and their foresight styles. The original research by Chen and Hsu (2020) applied a survey questionnaire of 578 valid student samples where five dimensions of futures thinking, namely, change agent, transdisciplinary system, long-term thinking, concern for others and openness to alternatives were identified. It showed that students who took futures courses demonstrate statistically significant higher performance in some dimensions of futures thinking. Most importantly, young students showed an optimistic attitude toward the future. To further enhance the external validity and construct effects of our continuing assessment of evaluation, in the following years we will adopt more tools of learning measurement with targeted population, random sampling, and mind robust heterogeneity of the selected sample (Cook & Campbell, 1979).

We first found that Dian's Foresight Styles Assessment (FSA) shared similar assumption with our research endeavor, to fill a gap in understanding the range and qualities of foresight competency. FSA attempts to describe the variety of behaviors ensconced in our human ability to plan and visualize the future and how they react to external change (Dian, 2009). The FSA was created as the Futures Styles Inventory by Dian with the help of Alm (Dian, 2001). The instrument was translated from Swedish to English in 2004 and renamed to FSA. The FSA was a 45-item survey instrument, collected a convenience valid sample of 3,154 from a website. A six-point (0, 3, 6, 9, 12, 15) Likert-style scale from "Does not describe me" to "Describes me perfectly!" was designed for participants to mark. The instrument also collected demographic data: gender, age, educational level, employment status,

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profession, degree area, employment type, job, native language, and country. As a result, the on-line survey collected a wide range of people around the world (75% English speaking), well-educated with age ranged from 20 to 99, and gender of female/male (61.4/38.6). Drawing on abundant theoretical literatures from temporal orientation, innovation/leadership, and propensity to Action, Dian proposed the six styles of foresight: Futurist, Activist, Opportunist, Flexist, Equilibrist, and Reactionist. (Fig. 1)

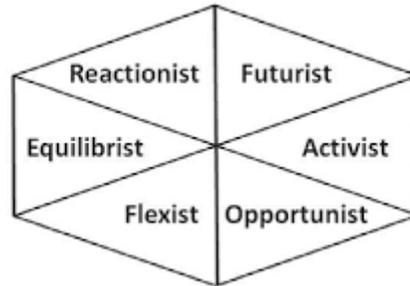


Fig. 1: Dian’s six foresight styles categories (Source: Dian, 2009, p. 67)

Table 1: Dian’s foresight styles categories and characteristics

FSA category	Cognitive tendency	Characteristics
Futurist	Future	Good at creating visions
Activist	Present/future	A natural doer
Opportunist	Present	Change the future by assuring the present is as good as possible.
Flexist (Leading group)	Present/future	Gets things done. Curious about new innovations. Advance ideas of Futurists and Activists
Flexist (Later group)	Present/past	Adapt new idea after it has been tested by others
Equilibrist	Present	Strive to maintain balance
Reactionist	Past	Often have trouble comprehending the reason for change

(Source: Dian, 2009, adapted by author)

Gary (2010, 2019) emphasized the importance of evaluations of foresight measurement and organizations and demonstrated great ways for new disciplines to integrate foresight into their practice, as in university’s leadership studies and foresight practitioner. In addition, that experience also relates to outcome assessments that generate students’ interests in learning futures and foresight. Gary (2009) has also done a thorough investigation examining Dian’s Foresight Styles Assessment to determine whether there is sufficient empirical support for his six proposed styles of foresight. Gary’s study, using principal components analysis, produced four factors underlying a refined 26-item FSA: Framer, Adapter, Tester, and Reactor. The first and last factors captured Dian’s categories of Futurist and Reactionist, while the other four categories did not match the original conceptualization. The result also has shown that the FSA instrument is valid and reliable with minimum construct validity for exploratory research. Gary suggested some directions for further research: (1) retain the refined 26-items to strengthen its reliability; (2) to gather a larger pool of test items to locate the four unmatched categories; (3) to start with a minor or incremental development with sample sizes of 100 to 200 participants to strengthen various factors; and (4) to norm the instrument through a stratified technique that matched the sample with a general population (Kerlinger & Lee, 2000).

Van der Laan and Erwee (2012) evaluated Gary’s (2010) four factors: Framer, Adapter, Tester and Reactor to measure strategy level leader’s dominant style of engaging with the future as a dimension of leadership competency. They found that three of the four original factor structures of the FSA (Framer, Adapter, Tester) were highly correlated and could be interpreted as an individual’s ability to engage with the future. The exception was the Reactor Style (Reactionist), which could not be theoretically justified and should be treated as a separate construct.

Importantly in the context of this research, they found that exposure to foresight concepts at a postgraduate level and level of foresight competence and strategic thinking was statistically significant. For this reason van der Laan and Erwee believe that the scale should not be limited to foresight styles assessment and would be useful to be applied to broader leadership cognition including envisioning ‘bigger picture’ futures (Framer), adaptable and flexible during change (Adapter), and willing to test preferable possible futures (Tester) (van der Laan & Erwee, 2012).

Simply stated, Dian’s six-trait FSA categorization is in correspondence to Rogers’ (2003) five behavioral adopter categories: (a) innovator/activist, (b) early adopter/flexist, (c) early majority/opportunist, (d) later majority/equilibrist, and (e) laggards/reactionist. Futurist is unique in seeing trends far earlier than everyone else, always look for perspectives and trying to see the whole picture. However, futurists’ ability to see far into the future is a handicap when working with other styles. While some may find their insights interesting, they don’t see relevance to their budgets and their action plan (Dian, 2009). Dian claims that all styles have value in a team context to navigate change and create the future. Also, a blend of styles within a person or team would enhance foresight.

The main research objectives of this study are: (1) to evaluate whether the Foresight Styles Assessment (FSA) is a valid and reliable instrument with a translated version from English to Mandarin Chinese version when applied to university students, (2) to analyze foresight styles or future orientation of young university students, (3) to investigate what learning outcome does futures course bring to influence their foresight styles, and (4) to examine if other demographical factors bring any intervening effects beyond the classroom setting? More, it is hoped that by asking the questions, as in interpretive research, the students’ futures thinking might be broadened. As Inayatullah (2020) stated that the role of the futurist, the foresight practitioner, is to determine given the worldview of those involved in the process, what is the most appropriate iteration of interventions.

A preliminary measurement of Foresight Styles Assessment

Evaluation is another form of learning. It provides information that maximizes the desired impact of foresight while deepening reflection about the process of the project itself (Gardner & Bishop, 2019). Consequently, it is important to put our fundamental hypothesis to a test that pedagogical intervention, an educational approach to exploring young students’ traits of futures thinking, might create a positive contribution to map the possibilities of forming a foresight team in the near future. Previous research (Chen, 2016, 2019; Chen & Hsu, 2020) have successfully shown positive futures pedagogical design in cultivating socio-cultural, environmental values and foresight capacity. This preliminary application of the FSA measurement attempts to apply an anticipatory learning and game-based futures design approach to explore the possible effects of transforming young students’ styles of futures thinking. Chen and Hoffman (2017) have successfully applied an experimental and innovative game-based curriculum design in enhancing college students’ learning capacity outside their major subjects. By applying a survey instrument into the course design, we might find constructive insights that students’ attitudes toward long-term thinking, innovation and roles as change agency.

The preliminary design was quasi-experimental with pre- and post-measurements, but without control group/random assignment of experiment group. Students who took the general education course “Social Futures” and “Exploring the future” were the participants. The survey data was collected in the Spring semester 2020, using the original 45 items. The statements used a 4-point Likert scale, scored from 1 (totally disagree) to 4 (totally agree). At this step, a small sample of 73 (social futures) and 37 (exploring the future) surveys were collected. The results were shown in radar charts comparing the mean scores of each style of foresight from pre-and post-measurement. (Fig. 2 & 3).

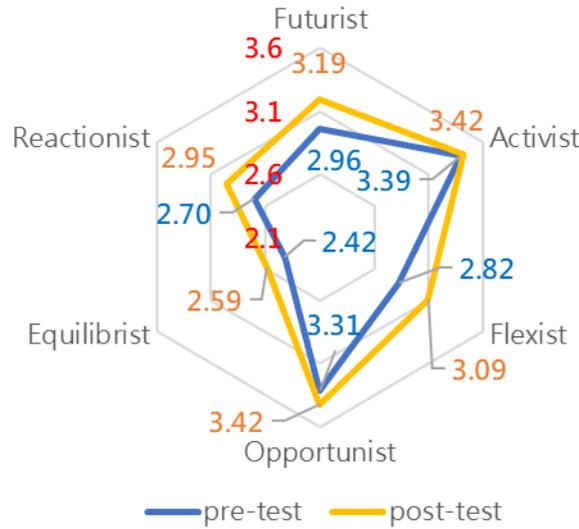


Fig. 2: Radar chart of pre and post-test mean difference of FSA: Social Futures

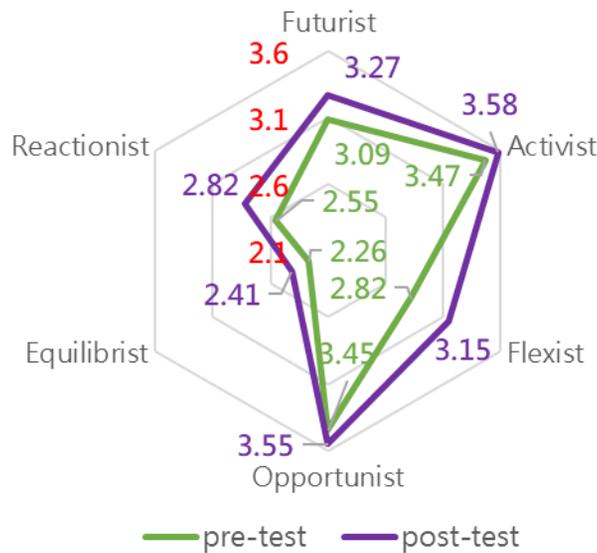


Fig. 3: Radar chart of pre and post-test mean difference of FSA: Exploring the Future

Results of pre- and post-testing have provided some clues in evaluating mean scores change in students’ foresight styles owing to the educational interventions (Table 2). Overall, the results indicated mean scores increase from each of the foresight styles, for both of the classes. The increases suggest that students have taken most of the statements more seriously in a positive direction. We further take mean scores from “exploring the future” class and conducted a t-test and found two statistically significant results, namely Flexist ($t=2.008, p<.05$) and Reactionist ($t=2.178, p<.05$). According to Dian, Flexists are more likely to become interested in the ideas put forwarded by Futurists and Activists and adopt the new concept, behavior or innovation. It could be generated from the futures curriculum design. On the other end, the Reactionists have their eye of the past, seeing the good and the secure and what is still working. They believe that change for change’s sake isn’t always good. The preliminary test has shown a significant number of students have put their favors toward Flexists and Reactionists after taken the futures course. However, the preliminary finding has to be further examined by a thorough evaluation of the FSA in the following section.

Table 2: Measurement of pre- and post-test of foresight styles

Styles	Tests	N	Mean	SD	df	T
Futurist	Pre	29	3.0852	.51199	64	1.604
	Post	37	3.2687	.41745		
Activist	Pre	29	3.4674	.35309	64	1.171
	Post	37	3.5796	.41004		
Flexist	Pre	29	2.8190	.69403	64	2.008*
	Post	37	3.1486	.63590		
Opportunist	Pre	29	3.4483	.39517	64	1.141
	Post	37	3.5514	.33799		
Equilibrist	Pre	29	2.2644	.76832	64	0.774
	Post	37	2.4144	.79118		
Reactionist	Pre	29	2.5517	.47424	64	2.178*
	Post	37	2.8176	.50569		

*p<.05

Reevaluating the FSA

The quantitative survey data used in this evaluation was collected in the beginning of fall 2020. The questions used a 4-point Likert scale, scored from 1 (totally disagree) to 4 (totally agree). This research collected a valid student sample of 1320. With a target population of 24,000 undergraduate students, the sample should be a good representation for statistical analysis. The reliability of the initial 45 items was tested by using Cronbach’s alpha, which showed a satisfactory level of internal consistency (alpha=0.927). The final construct of 33 items showing an even higher reliability (alpha=0.934). The reliability of five factors were from 0.708 to 0.887. A reliability coefficient of 0.70 or above is usually considered acceptable (Taber, 2018).

The student respondents’ age ranged from 18-23 years old with a balanced gender ratio (male/female: 50.3/49.7%). A higher percentage of freshmen (37.7%), relative to 28.6 percent sophomore, 18.4 percent junior and 15.3 percent senior. Most of them are from college of business and management (35.4%) and engineering (33.2%), while college of literature, foreign language, international affairs and education altogether makes up the category of others, 31.4 percent. A 30.2 percent of them have taken at least one futures course and 52.9% of them are active in participating student club activities. A 26.1 percent of them have had international exchange experience.

Table 3: Descriptive Statistics

Demographic variable	Responses	Total	Percentage
Gender	Male	656	49.7
	Female	664	50.3
Grade	Freshman	498	37.7
	Sophomore	377	28.6
	Junior	243	18.4
	Senior	202	15.3
	Other	415	31.4
College	Engineer	438	33.2
	Business	467	35.4
Club activities	Yes	698	52.9
	No	622	47.1
International exchange experience	Yes	344	26.1
	No	976	73.9
Futures course	Yes	398	30.2
	No	922	69.8

To empirically examine the construct of the questionnaire, two statistical procedures were applied to the 45-item survey. The Kaiser-Meyer-Olkin Measure of sampling adequacy (KMO) is a statistic procedure that portrays the proportion of variance in chosen variables that might be affected by underlying factors. Higher values (closer to 1.0) generally indicate that the data collected is appropriate for a following factor analysis.

Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy values were used to test the 45 items for applying factor analysis. The KMO value is .951($p < .01$) which indicates the result of sampling is more than adequate. According to these results, we could be confident to say that dataset of this research is suitable for factor analysis (Sharma, 1996). The total variance explained is 54.17% in nine factors, and the reliability of some factors are smaller than 0.5. The result indicates that some items have to be deleted to obtain a better model. Therefore, this research examined the 45 items through item analysis.

Item analysis is a technique that evaluates the effectiveness of items in tests. Two main principal measures used in item analysis are item difficulty and item discrimination. Seven indicators were used, including Mean($M=2.97$), Standard Deviation, Skewness, Comparisons of extreme group, Factor loading, Corrected item-total correlation, and Cronbach Alpha. All items were applied in the item discrimination to decide which item should be deleted. In order to obtain appropriate constructs, this research deleted items through eight rounds after item analysis. As a result, items 4 and 40 should be deleted in the first stage (Table 4).

Table 4: Item analysis

Indicators	Items	Indicators	Items
Mean ($n > 0.5 $)	2,15,36,41	Factor loading ($n < 0.3$)	4,8,10,18,29,32,40
Standard Deviation ($n < 0.6$)	17,26,41	Corrected item-total correlation ($n < 0.3$)	4,8,10,18,29,32,40
Skewness ($n > 0.8$)	14,41	Cronbach Alpha if item Deleted ($\alpha > 0.927$)	4,29,32,40
Comparisons of extreme group ($p > 0.5$)	4,8,10,18,29,32,40		

After removing items 4 and 40, principal components analysis (PCA) was used to extract the factors with 43 items. The eigenvalues were set as > 1.0 and loadings $> .3$. The result revealed 9 factors, and the cumulative variance is 55.34%. The second to seventh stages of analysis applied the correlation matrix, oblique rotation with Kaiser normalization after deleting the items from item analysis (Table 5). The factors chosen were down from 9 to 5, and the Cronbach Alpha is still relatively high at .934; the KMO is also good at .954. The ultimate best structure for further analysis is a five-factors construct model with 33 items. A total of 12 items were removed from the original scale construct. With the final 33 items to be analyzed, the Cronbach Alpha is .934, and the total variance explained is 52.13%. The result indicated that the refined FSA measurement has great promise to be an appropriate instrument for assessing futures competency.

Table 5: Seven stages of extracting the factors

stage	1	2	3	4	5	6	7
Total items	43	40	39	38	37	35	33
Items deleted	4,40	4, 40, 18,29,32	4,18,29,32, 40, 41	4,18,29,32, 40,41, 10	4,18,29,32,40, 41,10, 8	4,18,29,32,40, 41,10,8, 1,7	4,18,29,32,40, 41,10,8,1,7, 14,21
Cronbach α	0.927	0.935	0.936	0.936	0.936	0.935	0.934
KMO	0.951	0.954	0.956	0.954	0.955	0.955	0.954
Total variance explained	55.34%	54.57%	55.04%	53.63%	51.87%	53.48%	52.13%
Number of factors	9	8	8	7	6	6	5
The reason to delete items and extracting	One factors' reliability $< .5$, and two factors' reliability $< .6$	Two factors' reliability $< .5$	Only Q10 in one factor	Only Q3,Q5 in one factor	One factor(Q1 & Q7)'s reliability $< .5$	One factor(Q14 & Q21)'s reliability $< .5$	Cronbach $\alpha = .708 \sim .887$

Results

After the seven stages of removing unfitted items, the research retained 33 items of 5 factors, and the total variance 52.13 % explained, for further analysis. Those items removed were mostly from the categories of Equilibrist and Reactionist of Dian’s six foresight styles. Gary’s (2009) initial assessment concluded with a 26-items of 4 factors explained 41.72% of the variance. Also, with factors retained were from mixed categories of the original construct, he remodeled the measurement into a four orthogonal (unrelated) factors, namely Framer ($\alpha =0.78$), Adapter ($\alpha =0.89$), Tester ($\alpha =0.77$), and Reactor ($\alpha =0.66$). The last factor can barely be included into the new model since a value of .70 as the lowest acceptable bound for Cronbach’s alpha (DeVellis, 2003). The reevaluation of the FSA has a well improved scale performance. The original 5 foresight styles were preserved: Futurist ($\alpha =0.88$), Flexist ($\alpha =0.81$), Activist ($\alpha =0.73$), Opportunist ($\alpha =0.86$), and Equilibrist ($\alpha =0.71$). The random sampling method with an adequate number of samples from a targeted population should be the most significant contribution to this reevaluation of the FSA. Moreover, the translated Mandarin Chinese version of scale items to the native speaker should have caused less confusion in the expression of context.

Five major factors with items included, the reliability by Cronbach Alpha, and corresponding factor loadings are presented as followings:

Factor 1: Futurist

This factor contained 12 items, from Dian’s (2003) foresight categories, seven from the Futurist category, three from the Activist, and two from the Opportunist category. The reliability was .877, and the factor loadings were from 0.705 to 0.525 (Table 6). The factor was named and interpreted as “Futurist”. Futurists always look for perspective, understand that systems go up and down and that failure today could open the door to successes tomorrow to facilitate the development of best possible futures (Dian, 2009).

Table 6: Futurist Items from Principle Component Analysis with Oblique Rotation

Items	FSA Category	Factor loading	Cronbach α
33. I read a lot.	Futurist	.705	.877
45. I see to it that things happen when I understand that the future demands new ways to work and live.	Activist	.702	
35. I find new alternatives all the time.	Futurist	.677	
12. I see possibilities in all situations.	Futurist	.674	
43. I find it easy to see how different trends interact with one another.	Futurist	.671	
28. I read and take in information from many different areas.	Futurist	.666	
20. It is easy for me to associate and see new aspects of whatever occurs.	Futurist	.656	
34. I am conscious of and follow the big trends in society, business and politics.	Futurist	.629	
22. I have a clear vision of my own future.	Futurist	.620	
39. I follow the greater futures questions.		.616	
13. I try to build a picture of the future that is filled with nuances and alternate possibilities.	Futurist	.559	
16. I take the chance when it comes up.	Opportunist	.525	

Note: Extraction method: Principle Component Analysis, oblique rotation with Kaiser normalization

Factor 2: Flexist

This factor contained three items, from Dian’s (2003) foresight categories, two from the Flexist category, and one from the Opportunist category. The reliability was .812, and the factor loadings were from 0.861 to 0.831 (Table 7). The factor was named and interpreted as “Flexist”. Flexist are grounded in the present, but are often curious about new innovations which can improve survival capacity (Dian, 2009). Those three items were found to stay constantly in the same factor in different stages of factor extracting. Similar results were also found in the same factor named “Tester” by Gary (2009).

Table 7: Flexist Items from Principle Component Analysis with Oblique Rotation

Items	FSA Category	Factor loading	Cronbach α
15. I am an early follower of whatever is new.	Flexist	.861	.812
2. I test new products/trends very early after they come out.	Opportunist	.831	
36. I like to go along when new trends come.	Flexist	.831	

Factor 3: Activist

This factor contained three items, from Dian’s (2003) foresight categories, two from the Futurist category, one from the Activist category, and one from the Flexist category. The reliability was .731, and the factor loadings were from 0.782 to 0.536 (Table 8). The factor was named and interpreted as “Activist”. Activists work in a divided time-frame of present/future, and they are motivated by a strong commitment to what they do (Dian, 2009).

Table 8: Activist Items from Principle Component Analysis with Oblique Rotation

Items	FSA Category	Factor loading	Cronbach α
38. I like to influence others.	Futurist	.782	.731
9. I am active and influence others to make changes that are needed.	Activist	.772	
31. I like to help other people to be active and alert.	Futurist	.666	
30. I can quickly adjust to new situations.	Flexist	.536	

Factor 4: Opportunist

This factor contained nine items, from Dian’s (2003) four foresight categories, including Reactionist, Futurist, Activist, and Opportunist. The reliability was .860, and the factor loadings were from 0.748 to 0.468 (Table 9). The factor was named and interpreted as “Opportunist”. Opportunist try to change the future by assuring that the present is as good as possible (Dian, 2009).

Table 9: Opportunist Items from Principle Component Analysis with Oblique Rotation

Items	FSA Category	Factor loading	Cronbach α
26. It is important to react when "big" plans for the future are presented.	Reactionist	.748	.860
24. I integrate my values into my future plans.	Futurist	.748	
25. I am very interested in futures questions.	Futurist	.675	
27. I gladly take initiative to adjustments and changes in my work place.	Activist	.668	
17. My worldview changes based on information on what the future might signify.	Futurist	.663	
23. I gladly take advantage of trends that pop up when the opportunity arises.	Opportunist	.636	
19. I try to start up change projects that are needed in order to address the future.	Activist	.592	
37. I gladly try to create a trend that I can make use of.	Opportunist	.576	
42. I am a flexible person.	Futurist	.468	

Factor 5: Equilibrist

This factor contained five items, from Dian’s (2003) three foresight categories, including Equilibrist, Futurist, and Opportunist. The reliability was .708, and the factor loading was from 0.739 to 0.517 (Table 10). The factor was named and interpreted as “Equilibrist”. Equilibrist work in the present, and they are positive in that they keep the organization running (Dian, 2009).

Table 10: Equilibrist Items from Principle Component Analysis with Oblique Rotation

Items	FSA Category	Factor loading	Cronbach α
3. I do not rush into the future, I like to know 'what is coming' before trying it out.	Equilibrist	.739	.708
5. It is important to be alert so that today's actions don't become the future's problems.	Futurist	.734	
6. I realize how important it is to focus on future questions.	Futurist	.667	
11. I use information on the future as soon as I can in order to win advantages for my company or myself.	Opportunist	.542	
44. I want to work with the big picture in the projects with which I am involved.	Futurist	.517	

To further interpret the possible influences from the intervening variable of futures education and other demographic factors, a T-test for dichotomous descriptive variables and ANOVA for multiple categories of variables were applied. Table 11 showed the result of gender, the means of male students are all higher than those of female, particularly the t values were statistically significant in factor 1 and 2 (Futurist, 2.91/2.80, $t=3.81$, $p<.001$ and Flexist, 2.99/2.41, $t=-2.83$, $p<.01$). The finding coincides with the previous research (Chen & Hsu, 2020). Students who are active in participating in student club activities show significantly higher scores from Factors 1 to 4. In recent years, universities placed great emphasis on promoting student clubs and societies. Student clubs covering a vast array of areas, including charity and community volunteering, cultural research, academic learning, sports and athletics, martial arts, music, and many others. It is now commonly believed that extracurricular activities brought students with the “outside the box” innovative experience and perspective. On a similar vein, international exchange experience, including long-term studying abroad and short-term visits to sister-universities overseas, also contributed significant values to Factors 1, 2 and 4. The most important result is that students who have taken futures course exhibit a statistically significant t values in Factor 1 (Futurist, 2.90/2.83, $t=2.31$, $p<.05$). Among other factors, the mean score of those who have taken futures course are consistently higher than those who haven’t. Yet, the benefit of training young students into a full scale of foresight styles is still awaited to be proven in future research.

Table 11: Comparisons of Foresight Styles by socio-demographic characteristics

T-test statistics (two-tailed test)								
Factors	Gender(M/F)		Club(Y/N)		Futures taken(Y/N)		Int'l exchange(Y/N)	
	Mean	T	Mean	T	Mean	T	Mean	T
Futurist (F1)	2.91	3.81***	2.91	4.60***	2.90	2.31*	2.91	2.45*
	2.80		2.79		2.83		2.84	
Flexist (F2)	2.99	-2.83**	2.41	2.86**	2.39	1.198	2.36	.06
	2.41		2.30		2.34		2.35	
Activist (F3)	2.74	1.77	2.79	5.00***	2.72	.499	2.82	4.00***
	2.68		2.62		2.70		2.67	
Opportunist (F4)	3.18	1.75	3.21	4.40***	3.17	.922	3.22	3.13**
	3.14		3.10		3.15		3.13	
Equilibrist (F5)	3.30	3.14**	3.28	1.78	3.27	.698	3.27	.84
	3.22		3.23		3.25		3.25	

* $p<.05$; ** $p<.01$; *** $p<.001$

Table 12 shows the statistical difference in student classification in Flexist ($F=3.036$, $p<.05$) after applying One-way ANOVA analysis. No significant result found by Sheffé post hoc multiple comparisons. we could simply find that sophomore present the highest means across factors F1, F3, and F4. As educators of futures thinking and foresight in university environment, we mostly observe major differences between local and foreign students in terms of their foresight styles. However, the results cannot be shown in quantitative data since the measurement tool is in Mandarin Chinese.

Table 12: One-way ANOVA analysis of Foresight Styles by class

Factors	Class	Mean	SD	Source of Variance	SS	MS	F	Sheffé post hoc multiple comparisons
F1	(1)freshman	2.84	.49	BG	1.609	.536	2.200	--
	(2)sophomore	2.91	.45	WG	320.757	.244		
	(3)junior	2.83	.51					
	(4)senior	2.82	.49					
F2	(1)freshman	2.39	.72	BG	4.769	1.590	3.036*	--
	(2)sophomore	2.40	.74	WG	689.023	.524		
	(3)junior	2.33	.68					
	(4)senior	2.36	.75					
F3	(1)freshman	2.73	.60	BG	2.570	.857	2.232	--
	(2)sophomore	2.75	.59	WG	505.216	.384		
	(3)junior	2.65	.67					
	(4)senior	2.64	.65					
F4	(1)freshman	3.14	.45	BG	.705	.235	1.203	--
	(2)sophomore	3.18	.41	WG	257.283	.196		
	(3)junior	3.18	.45					
	(4)senior	3.16	.47					
F5	(1)freshman	3.27	.46	BG	.622	.207	.974	--
	(2)sophomore	3.26	.45	WG	279.985	.213		
	(3)junior	3.26	.44					
	(4)senior	3.21	.52					

*p<.05

Table 13 indicates students of Business and Management College present significantly higher mean scores than those of other Colleges in the factor of Equilibrant (F=4.661, p<.01). Compared to students of other colleges, students of Business and Management College are generally believed to be well-trained in transdisciplinary and multicultural thinking.

Table 13: One-way ANOVA analysis of Foresight Styles by college

Factors	college	Mean	SD	Source of Variance	SS	MS	F	Sheffé post hoc multiple comparisons
F1	(1)Other	2.81	.50	BG	1.225	.612	2.511	--
	(2)Engineer	2.88	.49	WG	321.141	.244		
	(3)Business	2.88	.49					
F2	(1)Other	2.32	.72	BG	.968	.484	.920	--
	(2)Engineer	2.37	.73	WG	692.824	.526		
	(3)Business	2.38	.72					
F3	(1)Other	2.71	.64	BG	.033	.016	.042	--
	(2)Engineer	2.70	.61	WG	507.753	.386		
	(3)Business	2.71	.62					
F4	(1)Other	3.15	.45	BG	.225	.113	.575	--
	(2)Engineer	3.15	.45	WG	257.764	.196		
	(3)Business	3.17	.43					
F5	(1)Other	3.21	.46	BG	1.972	.986	4.661**	(3)>(1)
	(2)Engineer	3.25	.49	WG	278.634	.212		
	(3)Business	3.30	.42					

**p<.01

Discussion and Conclusion

This research was a follow-up evaluation (Chen & Hsu, 2020) on the futures course learnings outcomes of Tamkang University students and impact of futures-oriented pedagogy as well as across a range of demographic measures, namely gender, involvement in university clubs, and being an international student. The modified FSA has been shown to be a reliable tool in measuring the impact of improvements to foresight competency. It joins a growing body of evidence-based research (Dian, 2009; Gary, 2010, 2019; Rohrbeck & Kum, 2018; Schwarz, Rohrbeck, & Wach, 2020; van der Laan & Erwee, 2012; Chen & Hsu, 2020) that confirm the statistical significance of futures orientated pedagogy. It also contributes to empirically linking exposure to futures studies as a key component of improving competency in the domains of leadership and strategic management (van der Laan & Erwee, 2012; Chen & Hsu, 2020; Chen & Hoffman, 2017).

The pre- and post- test scores of 1320 university students, found that those who took futures courses demonstrated a statistically significant higher score in the Futurist category - those who are “driven by the future” -looking for new perspectives, systems thinking, paying attention to the external environment for signs of change and visioning and seeing their visions in a positive way as compared to the in other demographic categories (Dian, 2009). This provides strong evidence that the educational intervention of the “exploring the future” class impacts students’ futures preparedness. Furthermore, students who undertook the futures class had a higher mean score demonstrated across all dimensions after the educational intervention of, suggesting that futures pedagogy can contribute to and should be area of focus for training organizational and government leaders (van der Laan & Erwee, 2012; Chen & Hoffman, 2017).

The reality is that most students find traditional classroom learning either boring or not relevant to prepare them for their future. The first 2007 Indiana University’s High School Survey of Student Engagement (HSSSE) of more than 81,000 students in 110 high schools across 26 states found that two out of three high-school students in a large survey say they are bored in class every single day. About 30 percent of the students indicate they were bored due to lack of interaction with teachers and 75 percent reported that the material being taught was not interesting. Fewer than 2 percent of students said they were never bored. The HSSSE survey consistently finds that students want more interactive classes and prefer activities that involve interaction with teachers and peers including more debate and more group projects (Bryner, 2007).

Bored students are not engaged and do not learn (Jackson, 2017). Futures courses as taught at Tamkang University are activity based, games based, participatory based and design-based learning where students have a role in their learning (Chen & Hoffman, 2017). This research provides empirical evidence that such experimental-innovative game-based futures methods provide students with the opportunity to recognize the interaction between their own understandings of the world as it is now and the vision of what it might become (Mallan & Greenaway, 2011). However, it is possible there is a correlation between the other three demographic factors of gender, involvement in university clubs, and being an international student with taking futures courses, which needs to be investigated further.

As in Chen and Hsu’s research (2020), males were found to demonstrate higher level of change- agent futures thinking than that of female students. This likely reflects the emergent position females still have in patriarchal Asian societies. Traditional Chinese proverbs such “Men decide, women follow” still casts a shadow on the achievement of desired feminist ideas regardless of the recent historical improvements (Chou, 2018; Evans, 2021). It could be argued that females engaging in futures courses over time would see their perceived ability to transform the future rise as Asian women rise (Inayatullah & Lu, 2018). Those who engaged in club activities showed significantly higher scores in four categories: Futurist, Flexist, Activist and Opportunist. Taiwan has an education system with a “stuffing the duck” approach to teaching, emphasizing the memorization of facts over learning skills (Chen, 2018). Involvement in university clubs allows students to gain new knowledge, skills and behaviors that students need to meet future challenges compared to uninvolved students (Foubert & Grainger, 2006). Members of clubs have been shown to acquire or develop enhanced communication skills, learn from others who have different ethnic backgrounds as well as enhancing their intellectual development (Harper & Quaye, 2007; Montelongo, 2002). Activities outside the classroom are known to be an important factor in creating multicultural and holistic thinkers (Heinonen, 2013). International students bring with them a number of advantages that support higher Futurist, Activist and Opportunist mindsets. They are independent, able to make decisions and deal with unfamiliar situations on their own, are flexible and adaptable, as well as being multilingual and multicultural.

The importance of this study has been to provide three key findings. The first, is that futures studies courses were empirically measured to show that they are important to improving the foresight capacity of students. Students have been shown to have a higher propensity to engage in foresight across all the dimensions studied. Second, to provide futures practitioners and teachers with appropriate feedback from futures learning evaluation to help them ameliorate their futures pedagogy design. Third, to provide insights that challenge the Taiwanese university system to move away from the factory model of learning. The FSA evaluation has provided evidence that the change toward co-design and activity based learning has an impact on students' leadership ability and foresight capacity, thus providing students with appropriate training and confidence in their ability to envision and lead or support change. It is the authors' intention to continue this research path and to push for change in the teaching and learning environment to convince teachers, schools and students that futures studies offers tangible improvements to enhance their foresight capabilities.

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