School Innovation: Teachers' Receptivity to Curriculum Innovation and Change

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Abstract: To meet the challenges posed by globalization, the Singapore government has implemented changes in the education system not only in curriculum content but more importantly in the delivery systems. Teach Less Learn More (TLLM) is an initiative that is about teaching better, to engage students and prepare them for life, rather than teaching more, for tests and examinations. It advocates various strategies to innovate the curriculum to enhance teaching and learning. This study focuses on teachers' receptivity in Victoria School, to the one of its school-based TLLM innovation strategies, the use of the Teaching for Understanding (TfU) framework for curriculum design. Receptivity to change was measured using a quantitative approach to examine teachers' perceptions and attitude towards the use of TfU in their teaching. Rogers Innovation Decision Process Model was used as a theoretical framework for this study. Surveys were administered to a sample of 40 teachers from Victoria School and a response rate of 100% was achieved. The findings showed that the staff in Victoria School as a whole, appeared to have a readiness for adoption of changes, namely the adoption of TfU as a new curriculum innovation. Attitudes toward the use of TfU in their teaching were mostly positively skewed. The means revealed differences within the respondents' demographics characteristics, adoption proneness, attitudes towards using TfU, extent of support services needed and barriers perceived influencing the extent to which they adopt TfU into their teaching; however, an analysis of variance (ANOVA) indicated significant difference between gender and TfU adoption. Results for items associated with supports services showed that 95% of the respondents indicated that were available for teachers use. 52.5% percent of the respondents reported to face barriers to the use of TfU in their teaching. Multiple regression analysis was conducted to determine what variables were the best predictors. The multiple regression analysis revealed that adoption proneness (R^2 0.495) proved to be a predictor for attitudes towards the use of TfU in teaching, while other selected demographic variables were not significant predictors.
Keywords: Adoption Proneness, Attitudes to use of Teaching for Understanding (TfU), Receptivity to change, Curriculum Innovation

1   Introduction
The global context of change in education

In the midst of unprecedented changes in society, schools have also been challenged with varied pressures that seek to alter education as it has been known for generations. Additional challenges are likely to arise as the rate of change continues to escalate, producing an increasingly pluralistic and complex society (Fullan, 1991).

Now more than ever before, school leaders, teachers, students and parents need to have a thorough understanding of the phenomenon of change. In the face of such uncertain and turbulent times, effective schools will be those who are capable in responding and adapting to ever-changing social, political, economic, and technological environments.

Goldring and Rallis (1987) have labeled such schools *dynamic*. Dynamic schools are those that have learned how to respond proactively to the innumerable and discontinuous

forces that are having an impact on them as they seek to improve, schools "that take charge of change" (p.23) rather than simply reacting defensively to or ignoring these forces.

The local context of change in education

Singapore has not been excluded from the flux of changes that have swarmed the global educational landscape. In response to the uncertain and rapidly changing global conditions, the emphasis of education policies in Singapore has shifted significantly from fostering economic development and social cohesion in the 60s, to focusing on developing creativity and innovation to support national economic success and competitiveness in the global economy today.

The government has stressed that to prosper in a new innovation led economy with mounting demands for new skills, knowledge, and flexible competencies in an increasingly globalised world and cosmopolitan cultural context, will require system-wide innovation and reform in education to ensure that Singaporeans are equipped to face the challenges ahead.

In 1997, the Singapore Ministry of Education (MOE) adopted "Thinking Schools, Learning Nation" (TSLN) as its vision. The Thinking Schools, Learning Nation vision describes a nation of thinking and committed citizens capable of meeting the challenges of the future, and an education system geared to the needs of the 21st century. Thinking Schools, Learning Nation has guided the implementation of several of MOE's new initiatives and programmes which aim at empowering schools with more autonomy to make timely local decisions, to optimally deploy resources and to implement programmes that cater to the needs of staff and students.

To further meet the challenges ahead, the Ministry of Education put forward the policy of Innovation and Enterprise (I&E) in 2003. In his speech on *The Next Phase of Education: Innovation and Enterprise* on 2 October 2003 at the Ministry of Education (MOE) Work Plan Seminar, Minister of Education, Mr. Tharman Shanmugaratnam stressed that to stay relevant and thrive in a rapidly changing environment, Singapore would have to move up the economic ladder by developing capabilities among all Singaporeans. To succeed in the future, Singaporeans would have to possess an inventive spirit where they would be willing to try new, untested routes, without fear of failure. Singaporeans would have to be bold and venture out to tap new opportunities, and to market their ideas and products anywhere in the world. In order to survive as a nation, Singapore would have to nurture citizens who would eventually be able meet the demands and challenges of the real world. This could only be done by preparing our youth in schools, and as a result, Ministry of Education would focus on fostering innovation and enterprise across the education system in the coming years. (Shanmugaratnam, 2003).

As part of the strategies to foster innovation and enterprise in schools, Prime Minister Lee Hsien Loong during his National Day Rally speech in 2004 said that "We've got to teach less to our students so that they will learn more." With these words, Prime Minister Lee Hsien Loong affirmed the direction that the education system would take in Singapore. In moving towards greater flexibility, the education system aims to nurture students with the capacity for independent thinking.

Under the umbrella of the Innovation & Enterprise (I&E) policy, schools and teachers have been empowered to develop innovative curriculum via initiatives such as Teach Less Learn More (TLLM) where teachers are given flexibility to incorporate more differentiated

pedagogies and independent learning strategies to enhance the quality of teaching in order to engage students in deeper understanding and passion for what is taught.

Teach Less Learn More builds on the groundwork laid in place by the systemic and structural improvements under Thinking Schools Learning Nation, and the mindset changes encouraged in schools in Singapore under Innovation and Enterprise. It continues the Thinking Schools Learning Nation journey to improve the quality of interaction between teachers and learners, so that learners can be more engaged in learning and better achieve the desired outcomes of education as spelt out by the Ministry of Education. The relationship between Thinking Schools Learning Nation, Innovation & Enterprise and Teach Less Learn More is shown in Figure 1 (MOE, 2005).

The key Teach Less Learn More recommendations focus on Learners, Teachers and School Leaders. An open and sharing culture will be promoted within schools and across the entire education community. To realise engaged teaching and learning, Ministry of Education will provide support for school-based initiatives. School leaders and teachers need to have sound values and beliefs, in providing every child with the opportunity to be developed to the fullest. The Teach Less Learn More framework is shown in Figure 2.
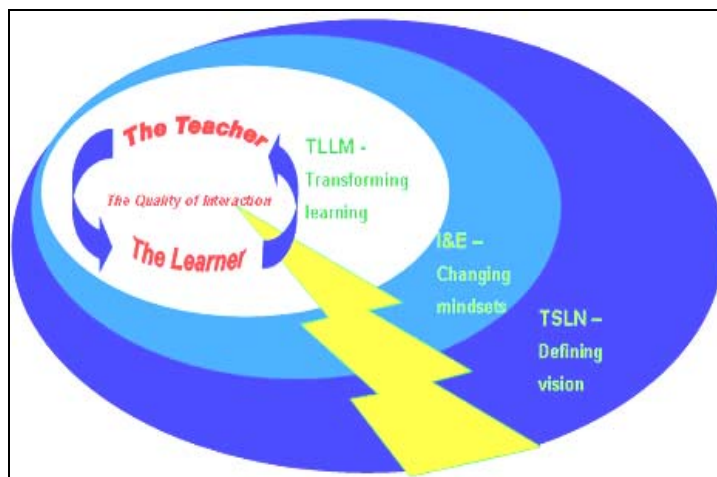

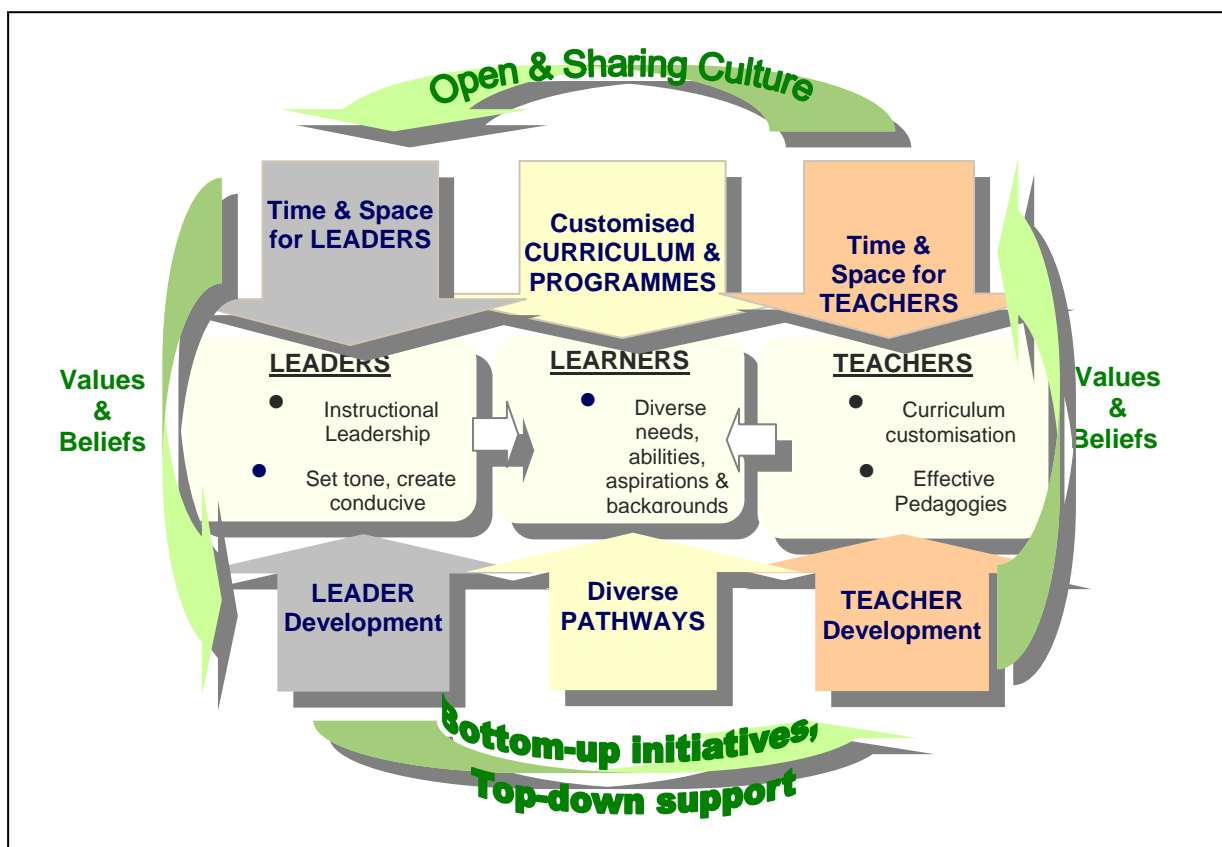Figure 1: *The relationship between TSLN, I&E and TLLM*
Source: http://www.moe.gov.sg/bluesky/tllm.htm#a

Figure 2: *TLLM Framework*
Source: http://www.moe.gov.sg/bluesky/tllm.htm#a

2   Purpose of the Study

The future of education is strongly dependent on how teachers deal with the process of rapid change. This poses a huge challenge to the education system and brings to the forefront questions regarding teachers' readiness and attitude towards accepting the plethora of changes within the education system.

This study addresses aspects of the innovation-decision process posited by Rogers (1995). The purpose is to investigate teachers' attitudes towards innovation and change in Victoria School, which is a single sex secondary school catering to boys aged between thirteen and sixteen years old. Victoria School is one of the oldest educational institutions in Singapore having been in existence since the 1880s. It is a vibrant school, with a rich tradition and culture.

The study is linked to the Singapore government's call to foster Innovation and Enterprise (I&E) in schools aimed at developing students who are creative, active learners with critical thinking abilities. The study will focus on the school-initiated curriculum innovation implemented in Victoria School under the initiative of Teach Less Learn More (TLLM). To narrow down the scope of TLLM strategies, the research will specifically investigate teacher's attitudes to the use of the Teaching for Understanding (TfU) framework to innovate the school curriculum.

The purpose of this study was to address the following research question:

To what extent are teachers in Victoria School prone to adopting changes?

More specifically, these are the questions that guided the research:

i)   What attitudes do teachers have toward using TfU in their teaching?
ii)   To what extent does the presence of support services affect teachers' attitudes to TfU?
iii)   To what extent do teachers perceive that barriers exist to the use of TfU in their teaching?
iv)   What relationships exist between selected demographic characteristics of teachers (i.e. years served as teacher, teaching department, gender and age) and attitudes to the use of TfU in their teaching?
v)   To what extent do the variables above predict the use of TfU in teaching?

The Teaching for Understanding (TfU) framework has been developed through a 6-year project at Project Zero of the Harvard Graduate School of Education. The big idea in TfU is to bring knowledge to life by engaging students in active learning. It is predicated on the assumption that knowledge is a human construct and that learners must play an active part in changing their minds, making sense, connecting prior ideas with new ones, thinking with what they learn, and creatively applying knowledge in novel situations i.e. understanding requires thoughtful application of ideas that are meaningful in the performance context.

Essentially, TfU is a constructivist approach to teaching and learning through 5 interacting elements used in planning and carrying out instruction when understanding is the goal:

- **Generative topics** are study selections that are both important in some discipline and engaging to students and teachers.

- **Understanding goals** is reflected through explicit and public statements about what has been developed and achieved so that students can understand what they are expected to learn.

- **Throughlines** are indicated by course length understanding goals.

- **Performances of understanding** provide opportunities for students to use what they know actively and thoughtfully in new situations and ways that develop and demonstrate the understandings regarding the understanding goals.

- **Ongoing assessment** is accomplished through frequent checks by students and teachers of how understanding is developing throughout a sequence of instruction. It is formative and not merely summative   (Blythe, 1998).

It is important for teachers to be receptive to the proposed change in curriculum design as posited by the TfU framework, as well as, be able to adopt the curriculum innovation in their instructional methods so that they can make the changes more permanent.

There has been a constant flurry of changes year after year within the education landscape in Singapore and the expectation has always been that teachers have to adopt and implement

these changes. While decisions for change are mandated by the central education authority in Singapore, the Ministry of Education, teachers are rarely consulted in the decision making process. Little has been studied about teachers receptivity to such changes before, during or after the changes have been implemented and how this affects the success of the innovation in a school.

As with any major educational change, the receptivity of school leaders, teachers and students is a significant determinant of the success of such a change or innovation. It is thus reasonable to argue that teachers' receptivity, attitudes and perceptions regarding the use of such innovations in their teaching will likely contribute to their accepting or rejecting their use. The future of education is linked to how we deal with the complex process of change. Bowman (1999) highlights views that primarily demographics, technology, and knowledge drive change. The implication of such a contention is that "orchestrating change will be the greatest organizational challenge in the foreseeable future" (Bowman, 1999, p. 295). However, the drawback of change is inevitable "whenever human communities are forced to adjust to shifting conditions, pain is ever present" (Kotter, 1996, p.4).

3   Theoretical Framework

To bring clarity and focus, Rogers Innovation Decision Process Model is used as a conceptual framework for this study. The model is shown in Figure 3.

Rogers (1995), conceptualized the model of the innovation-decision process into five stages: Knowledge Stage, Persuasion Stage, Decision Stage, Implementation Stage, and Confirmation Stage.

Rogers' model has been used in several studies on diffusion and innovation. Cuban (1986) found that a positive relationship existed between acceptance of innovation, compatible with values, norms, procedure, and facility. In the decision stage, adoption proneness of the innovation within the organization may contribute to whether the teachers adopt or reject an innovation which in this case impacts the implementation stage of Teaching for Understanding (TfU) in teaching as a tool to innovate the curriculum.
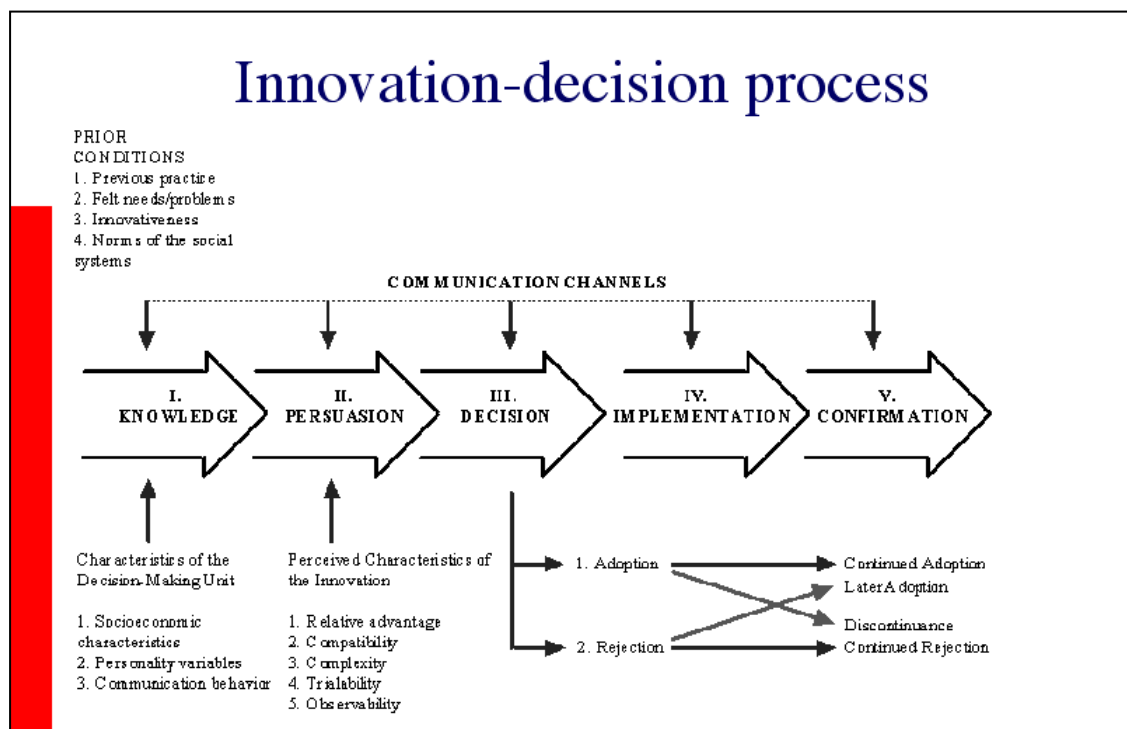
Figure 3: *Rogers Innovation Decision Process Model*
Source: http://www.ucalgary.ca/~dmjacobs/phd/lecture/sld005.htm

Rogers (1995) concluded that the individual makes the final decision whether to use an innovation or change a behavior. An individual's attitude to change is the determining factor in whether he or she will adopt and use a curriculum innovation in his or her teaching.

The innovation-decision process model includes five distinct characteristics that help to explain the speed in which individuals adopt a new idea since innovations are different and thus are not equivalent in their adoption rate by individuals. The five characteristics include relative advantage, compatibility, complexity, trialability, and observability (Rogers, 1995). The first characteristic, relative advantage, is the degree that an individual perceives that an innovation is better than the one used previously. For example, if the individual perceives that the new idea saves time, he or she will adopt the innovation faster. Next, compatibility is the degree that an innovation is consistent with an individual's values, past experiences, and needs. A new idea that is more compatible with the individual's life situation will be adopted faster. The third characteristic is complexity which is the extent that an innovation is perceived to be difficult to understand and utilize. Trialability concerns the degree that an individual will experiment with an innovation on a trial basis. Innovations that can be tried on a limited basis on an installment plan are usually adopted more rapidly. Finally, observability is the extent that the results of an innovation can be seen by other people. According to Rogers (1995), past diffusion research has been mainly composed of technological ideas.

In addition, Rogers (1995) classified adopters into five categories, which consist of innovators, early adopters, early majority adopters, late majority adopters, and laggards. The five adopter categories are organized into a distribution of an individual's change in adoptive behavior that results in a bell-shaped curve over time and is used to categorize the adopter distribution into a range along a continuum.

4   Research Design

A non-experimental correlational survey design was used to get a general picture of teachers' receptivity to the use of the TfU framework in their teaching in Victoria School. Survey research is often used when a researcher seeks to assess attitudes, perceptions, and opinions (Glatthorn, 1998).

The framework for the study was as follows:

- **Dependent Variable** = Teachers attitudes to the use of TfU as a curriculum innovation in their teaching
- **Independent Variables** = adoption proneness, support services, TfU barriers, department teachers belonged to, years served as teacher, gender and age.

Receptivity is defined as the willingness to change, transform or convert or receive ideas. In this study, receptivity to change is defined as an attitude to adopt the TfU framework into teaching. Receptivity towards use of TfU in teaching was measured based on behaviour intentions and evaluative attitude. Attitude is defined as a preference along a dimension of favourableness or unfavourableness to a particular group, institution, concept or object. (Sax, 1989). In this study it was defined as a preference along a dimension of favourableness or unfavourableness towards the use of TfU in teaching. This predisposes the teacher towards a general evaluation of whether the TfU as a curriculum innovation serves a worthwhile purpose.

Participants were selected using a stratified simple random sampling method. This method of sampling ensured that there was an adequate sample size for sub-groups in the population of interest. Table 1 shows the characteristics of the study sample.

Table 1: *Summary of Study Sample*

Characteristics of Sample (n=40)							
Gender	**Male** **20**				**Female** **20**		
*Departments	**EL** **6**	**M** **5**	**SC** **6**	**GEP** **5**	**MT** **5**	**PE** **3**	**HU** **5**	**A&T** **5**
Teaching Experience	**Under 1 yr** **5**		**1-5 years** **13**		**6-10 years** **12**		**11 years plus** **10**	
Designation	**Heads of Departments** **5**		**Subject Heads** **5**		**Senior Teachers** **2**		**Education Officers** **28**	

*Departments: EL (English), M (Mathematics), SC (Science), GEP (Gifted Education Programme), MT (Mother Tongue), PE (Physical Education), HU (Humanities), A&T (Art and Technology)

To assess teachers' willingness to adopt innovations in curriculum the Oscarson's (1976) Scale to Measure Adoption-Proneness was used. The scale is appropriate in this study as it was developed to determine an individual's predisposition for considering new ideas and practice (Oscarson (1976) cited in Zakaria, 2001). Oscarson (1976) and Aneke (1996) as cited in Zakaria (2001) used correlational analysis to determine the validity of the scale.

Oscarson (1976) used the Spearman Brown formula to obtain a reliability value of .95 for the whole instrument. Studies thus show that the scale is both valid and reliable.

The questionnaire contained five parts. Part 1 was designed to collect descriptive data. Demographic items such as year of birth, gender and number of years teaching were included. Studies by Oscarson (1976) and Rogers (1995) show that these items tend to be predictors to attitudes towards change.

A 6 point Likert scale was used in Part 2 to assess teachers' willingness to adopt innovations. Part 3 consisted of bipolar adjective pairs to measure attitude towards change (e.g. meaningful – meaningless). Part 4 included statements along a Likert-style scale which address the area of support services for teachers. Part 5 included statements to elicit participants response to what they perceived as Barriers to TfU adoption.

Descriptive analyses of data were used to determine the frequencies, means, and standard deviation of the dependent and independent variables. Analysis of variance (ANOVA) was used as it is useful in detecting and testing the significance of interactions between variables. One-way ANOVA was employed to determine whether several sets of scores have different means. For example, a t-test was performed to determine differences between male and female teachers receptivity to use of TfU. A one-way ANOVA was done to see variance between department and attitudes to TfU use. The F-ratio derived provided information on the goodness of the fit to the data.

To determine the extent to which the variables predict receptivity to TfU use in teaching, multiple regression analysis was carried out. Correlational and multiple regression analysis were employed to determine the relationships among the dependent variable and the independent variables. Multiple regression was performed using adoption proneness, support services and barriers to TfU as independent variables, and attitudes to use of TfU as the dependent variable. Multiple regression was performed using selected demographic variables (i.e. gender, teaching departments, years of teaching and age) as independent variables.

5   Results

A 100% response rate was achieved for the survey that was undertaken over a 3-week period. Out of the 40 respondents, 50% were male and 50% were female. Majority of the respondents were between the ages of 26-35 years old and had an average of 6-10 years of teaching experience.

Research Question 1: To what extent are teachers in Victoria School prone to adopting changes?

The adoption-proneness scale results had an overall mean of 4.15 and an SD 0.86 suggesting that most respondents indicated a positive inclination towards trying new innovations. Most items scored positively with the exception of 2 items. The items on contacting other institutions about new innovations and having a new innovation brought under the scrutiny of other colleagues scored the lowest.

Research Question 2: What attitudes do teachers have towards using TfU in their teaching?

Attitudes of teachers was measured using a scale characterized by several bi-polar adjectives which presumed to measure the teachers overall evaluation of the use of TfU in their teaching. The bi-polar adjectives used were Good-Bad, Meaningful-Meaningless, Pleasant-unpleasant, Happy-Unhappy and Comfortable-Uncomfortable. The results showed

that there was a slightly skewed distribution (mean = 4.28, standard deviation = 0.922) for variation in response to the teachers best judgment of their feelings regarding the use of TfU in their teaching.

For the item on good-bad, the results show a greatly skewed distribution, where the teachers revealed a generally good response towards the use of TfU in their teaching.Of all the bi-polar adjectives used to evaluate attitudes towards the use of TfU in teaching, the comfortable-uncomfortable scale scored the lowest mean of =3.88. A high percentage of teachers indicated that they were uncomfortable using TfU in their teaching and this could perhaps be attributed to the fact that the TfU framework has only been operationalised since the beginning of this year. While most teachers have been trained, many might still feel a little uneasy and uncomfortable using the framework in their daily teaching. As with any change or new initiative, some level of discomfort is to be expected as coping change is never an easy process.

Research Question 3: To what extent does the presence of support services affect teacher's attitudes to TfU?
Respondents perceived support services to be available to enable them to incorporate TfU in their teaching. The results for the availability of technical, instructional and structural support services revealed a slightly skewed distribution with majority of teachers indicating that the presence of services does affect a teacher's attitude to TfU. About 85% of respondents indicated that they would use TfU in their teaching if they received adequate support highlighting the importance of support services in influencing teachers' usage of TfU.

On frequency of support services needed, the results showed that 54% of the respondents needed frequent instructional support and this can be attributed to the lack of training and confidence in using TfU in the teaching. As TfU is a very new curriculum innovation in Victoria School, teachers may need assistance in using appropriate strategies at various stages of their teaching to implement TfU successfully.

Majority of teachers (70%) have indicated the need for structural support such as time and space for planning TfU units. This is probably the case as teachers in Victoria School operate on a very hectic schedule and often lack time to come together in collaborative teams to design lessons using the TfU framework. Teachers would probably find it helpful if structural support was present as it would facilitate the TfU planning process which can be time consuming. Resistance and negative attitudes can prevail when teachers do not have sufficient time to plan and design their lessons using the TfU framework.

Research Question 4: To what extent do teachers perceive that barriers exist to the use of TfU in their teaching?
About 52.5% percent of the respondents reported to face some barriers to the use of TfU in their teaching. Barriers to TfU use were in the form of access to infrastructure, instructional software, technical support, instructional support, lack of TfU skills, lack of time to acquire TfU skills, lack of experience with TfU, lack of training for TfU and lack of confidence in using TfU and lack of time for TfU lesson planning.

As predicted, teachers in Victoria School would perceive the lack of time to be the greatest barrier to TfU use in their teaching. Designing lessons using TfU principles is a time consuming endeavour and teachers find it difficult to invest time in TfU as they have several other commitments such as Co-curricular activities, enrichment programmers and remedial

classes to carry out, and they are really hard pressed for time. The results show that most teachers have the confidence to carry out TfU in their lessons but face the main barrier of lack of time for TfU training and TfU lesson planning. The lack of opportunity for TfU training was also a considerable barrier. It is interesting to note that teachers feel confident about using TfU in teaching when many of their responses show that they also feel that they have not received sufficient TfU training. It does seem contradictory to feel confident about using TfU yet indicate the lack of TfU training as a barrier. Perhaps confidence in this case could be the individual's perceived level of confidence rather than actual confidence level.

Research Question 5: What relationships exist between selected demographic characteristics of teachers (i.e. years served as teacher, teacher department, gender and age) and attitudes to the use of TfU in their teaching?

To assess the relationship between the teachers selected demographics and attitude towards TfU use in teaching, variables with two categories (gender) was examined using the One-Way ANOVA. Similar examinations were done for other variables with several categories i.e. department, years of service and age. Correlation was used to identify relationship for continuous variables for the various demographics.

From the results, it was evident that there was an insignificant difference between genders as the calculated F value (0.200) needs to exceed the F-critical value in order to have a significant difference between genders. There was also insignificant difference between the other demographic variables and use of TfU.

The correlation between demographic variables and the attitude to TfU use was also performed. From Table 2, it can be seen that males showed a very strong (0.738) correlation with adoption proneness and attitudes to TfU, while females showed a moderate to high (0.673) positive correlation. The higher adoption proneness indication for males compared to females in their attitude towards the use of TfU in teaching is consistent with other studies that have been done earlier on the adoption of change between genders. Halloran (1967) and Dohmann (1970) found that men were more receptive to change compared to women who were more resistant to adopting change.There was a low negative correlation (males -0.304, females -0.224) between attitudes to TfU and barriers to TfU for both genders.

Correlational analysis between departments and their attitude towards adoption proness to TfU showed a high positive coefficient except for the Humanities department (low positive coefficient). Correlations were also performed between years of service, age and the educational level of the respondents, their adoption proneness and attitudes to TfU in teaching. Findings revealed that those falling within the range of 2-5 years of teaching experience showed a higher correlation to adoption proneness to TfU in teaching, while those in the age bracket of 55+ indicated a higher adoption proneness to TfU in teaching.

Table 2: *Correlation Coefficients Among Genders and Teacher Attitudes to the Use of TfU in Teaching*

FEMALE				
	Attitude towards TfU	Adoption-Proneness	Support Services	Barriers to TfU
Attitude towards TfU	1			
Adoption-Proneness	0.6725865	1		
Support Services	0.4475978	0.4286171	1	
Barriers to TfU	-0.3040771	-0.1173683	0.2075764	1

MALE				
	Attitude towards TfU	Adoption-Proneness	Support Services	Barriers to TfU
Attitude towards TfU	1			
Adoption-Proneness	0.7378412	1		
Support Services	0.4341686	0.2982158	1	
Barriers to TfU	-0.2242931	-0.1898881	0.0436138	1

As seen in Table 3, there was a general trend indicating a high positive correlation between attitudes to TfU and adoption proneness with increasing age except for the 46-55 years age group which showed the lowest adoption proneness tendency amongst all. This age group showed a negative low correlation to adoption proneness. These are possibly teachers who are have years of teaching experience and prefer to remain in their comfort zones doing what they have always done rather than try new things which will take up more time and effort.

In fact by studying the results for age and years of experience, teachers who have 11-15 years of experience and fall within the age group of 36-45 years, show the lowest tendency to adoption proneness and may be a danger group who may show possible resistance to adopting TfU into their teaching. However, given the small sample size for the age group 36-45 years (n=3), such a conclusion may not be valid or accurate. A further study with a larger sample size would provide more useful data and conclusions.

It is also interesting to note the high level of adoption proneness for teachers with over 20+ years of experience. These are highly likely to be heads of departments who are committed to the teaching field and are constantly in the forefront of any kind of organizational or curriculum change within the school.

Table 3: *Correlation Coefficient Among Ages and Teacher Attitudes to the Use of TfU in Teaching*

AGE: 26-30				
	Attitude towards TfU	Adoption-Proneness	Support Services	Barriers to TfU
Attitude towards TfU	1			
Adoption-Proneness	0.7535356	1		
Support Services	0.1186636	0.3111155	1	
Barriers to TfU	-0.3983708	-0.4957587	0.2278842	1
AGE: 31-35				
	Attitude towards TfU	Adoption-Proneness	Support Services	Barriers to TfU
Attitude towards TfU	1			
Adoption-Proneness	0.7800872	1		
Support Services	0.3825183	0.0839967	1	
Barriers to TfU	-0.1612139	-0.0337677	0.0406617	1
AGE: 46-55				
	Attitude towards TfU	Adoption-Proneness	Support Services	Barriers to TfU
Attitude towards TfU	1			
Adoption-Proneness	-0.2714701	1		
Support Services	0.2380318	0.8469407	1	
Barriers to TfU	-0.9675949	0.4754673	0.0023037	1

AGE: 55+				
	Attitude towards TfU	Adoption-Proneness	Support Services	Barriers to TfU
Attitude towards TfU	1			
Adoption-Proneness	0.9725303	1		
Support Services	0.8542422	0.8951691	1	
Barriers to TfU	-0.6565	-0.617736	-0.2064674	1

Research Question 6: To what extent do the variables above predict the use of TfU in teaching?

To determine the extent to which the variables predict attitudes to TfU use in teaching, a multiple regression analysis was performed. Multiple regression was performed using the adoption proneness, support services, barriers to TfU and selected demographics as independent variables, and attitude towards TfU use as a dependent variable. The results revealed – adoption proneness (R^2 0.495, F = 37.319, p < .01), support services (R^2 0.184, F = 8.545), and barriers to TfU (R^2 0.073, F = 2.987). The results showed that adoption proneness proved to be a predictor for attitudes to TfU use in teaching. The multiple regression analysis revealed that adoption proneness showed the best predictability to attitudes to use of TfU in teaching. The results imply that a 49.5% variation in attitudes can be explained by the variability in adoption proneness. This shows a moderate correlation.

Multiple regression was carried out on selected demographic variables (i.e. gender, age, department, length of service and educational background) as independent variables, and attitude towards TfU use as a dependent variable.). Results of these regressions included: gender (R^2 0.0065, F = 0.243), Age (R^2 0.0019, F = 0.071), Department (R^2 0.046, F = 1.784), Length of service (R^2 0.0011, F = 0.039) and educational level (R^2 0.1435, F = 6.20). The only conclusion derived from these results is that the educational level proved a better overall predictor for TfU when compared to other demographic variables. However, demographic variables in general, were not predictors of teachers' attitudes to the use of TfU in their teaching.

6   Conclusions and Recommendations
Relationship among variables

A majority of the respondents reported that they 'frequently or almost always' supported efforts toward innovation and were thus receptive to new innovations. Of the 17 items on the adoption-proneness scale, all the items had means of over 4.0 except for questions 12 and 14 which were about having an innovation brought under careful scrutiny by colleagues and contacting other schools when trying out a new innovation respectively. This revealed that the respondents were generally positive about innovation. Teachers were receptive to trying new ideas and programmes but their willingness could be restricted because of inaccessibility to resources.

Results of teachers' attitudes towards the use of TfU in teaching skewed towards the positive extreme attitudes of "good, meaningful, pleasant and happy" with exception to 'comfortable' which skewed towards the negative attitudes. The positive attitudes are consistent with the high adoption proneness scores where one would assume that individuals who are adoption prone to innovations would show positive attitudes to using a new curriculum innovation. It would be fair to conclude that teachers who are more receptive to new ideas and programmes are more likely to show a more positive attitude towards using TfU in their teaching.

One approach to affecting change in an organization is where attempts are made to contact other institutions to find out and learn from the innovative practices that have adopted. Unfortunately, teachers often lack clear channels to accomplish this directly and easily. Thus, to ensure a higher adoption of a curriculum innovation such as the TfU, Victoria School should create opportunities for its staff to grow professionally through attachments to other schools or organizations which may have already implemented the TfU framework.

Applicability of Rogers Innovation Decision Process

Rogers' Innovation Decision Process model provided the theoretical framework for this study. Rogers (1995) pointed out that organizations were involved in one way or another in adoption of educational innovation; actions that might be taken by organizations include collective action on and/or authority over an innovation.

The results of the study indicate that only adoption-proneness correlated with teachers' attitudes towards the use of TfU in their teaching. Other variables such as barriers and presence of support services did not appear to affect teacher's attitudes significantly in this study. This is contrary to Rogers' Model. In diffusion theory terms, the provision of professional development can be read as an attempt to reduce the degree of difficulty associated with adopting and using an innovation; in simple terms, to make it easier for users to take up the innovation. Using Rogers (1995) concepts of complexity, compatibility and relative advantage, the professional development can also be read as a means of increasing the compatibility of the innovation: the degree to which it matches the values and experiences of the individual adopters. By delivering professional development in which teachers are instructed and given many examples of how TfU can be used in instructional programmes, serves to make the innovation more compatible with the experiences of teachers. The professional development also serves to reduce the complexity of the innovation making the innovation 'easier' for teachers to use.

However, results of the study show that while teachers in Victoria School indicated they did not have sufficient professional development to use TfU in their teaching, yet their scores for attitudes towards use of TfU in teaching were largely positive in spite of the lack of training opportunities. This may be the case as teachers have come to realize that in order to move ahead in a changing educational landscape, that they have to implement TfU into the curriculum as mandated by the school leadership. It is also a possibility that as I am part of the organization, the staff may have been hesitant to reflect a negative attitude towards TfU fearing that they may be singled out. Even though the survey was anonymous, it would still be possible to track teachers based on their demographic information.

Findings of the present study suggest that Victoria School is at the second stage of the innovation-decision process where staff members are at the Persuasion stage and forming attitudes about using TfU in their teaching. The full extent of Rogers's model may not be fully applicable to secondary schools in Singapore which have similar characteristics such as Victoria School as the decision to accept or reject an innovation often does not lie with the individual, but is decided by the school leadership or Ministry of Education.

Rogers may have overlooked the occurrence of top-down delegation of curriculum innovations where subordinates have to inadvertently accept whatever decisions that had been made by the school leaders. The lack of other predictors of TfU use in teaching may have possibly been due to the fact that, collectively, teachers in Victoria School were not part

of the innovation decision process and while they were ultimately the implementers of the innovation, they may not have felt ownership of the change to incorporate TfU into their teaching. Perhaps the teachers may have felt that the decision to use TfU in their teaching was thrust upon them with little consultation of their views by school leaders.

The five stages of the innovation-decision process may not have accurately represented the context of Victoria School at the time of the study. The innovation-decision is made through a cost-benefit analysis where the major obstacle is uncertainty. Teachers will likely adopt an innovation if they believe that it will, all things considered, enhance their utility. So they must believe that the innovation may yield some relative advantage to the idea it supersedes. Also, in consideration of costs, teachers would likely determine to what degree the innovation would disrupt other functioning facets of their daily life. Since people are on average risk-averse, the uncertainty will often result in a postponement of the decision until further evidence can be gathered. But the key is that this is not the case for everyone. Each individual's innovation-decision is largely framed by personal characteristics, and this diversity is what makes diffusion possible.

The analysis of the results which emanated from this study purports that there has been a 'bureaucratically driven escalation of pressures, expectations and controls concerning what teachers do and how much they should do within a teaching day…' (Hargreaves, 1994: 108). Smyth (2003: 3) also shows acute awareness of the extent of the problem when he notes that "'teachers are currently experiencing 'difficult times' as their work is assailed, prevailed upon, reformed and restructured by forces bent upon …intensification".

What seems contradictory is the fact that the existing literature on 'intensification' depicts the problem as one where the governments globally are increasingly usurping control of what happens in the classroom and the kind of decisions that teachers can make. Yet, under the banners of initiatives such as the Teach Less Learn More in Singapore, teachers are afforded decision-making space and authority of an unprecedented nature. Given that the teachers can make appropriate choices on content, classroom activities and so on, but within the broader national framework of the pre-specified critical and specific outcomes of education, one could quite safely argue that they have semi-autonomous decision-making powers. Despite this apparent flexibility in curriculum decision-making, it seems as if the work of teachers currently operating at the intersection of Teach Less Learn More and the traditional curriculum is characterised by the very same manifestations of intensification which Hargreaves (1992) enumerated. These include heightened expectations, increased accountability, more administrative work, enforced diversification of expertise and a lack of time for proper lesson preparation and professional development. The results of the study show that teachers indicate that the lack of time for TfU training and planning of TfU lessons is a significant barrier to the use of TfU in their teaching.

When teachers' minds are preoccupied with survival, cutting corners and mere coverage of the content, effective teaching and learning is severely compromised. What is alarming though, is policy-makers' technical-rational assumptions that teachers have the capacity and willingness to change their patterns of decision-making in line with the new policy directives. However, not much has been done to study teachers' concerns and readiness to adapt to constant changes proposed in the education system as this is certainly the case in Singapore. It is hoped that the results of this study will provide school leaders a platform to further investigate teachers' readiness and sense of ownership in the curriculum innovation process at Victoria School.

Recommendations for Further Research

The results from this research have proven useful however may not be to very significant due to the large number of variables involved in relation to the sample size which was very small. In order to gather more significant data, a further study could be done using a larger sample size so that results gathered would be more generalizable to a larger community of teachers. In addition, it would be useful to do a multi-centred study to investigate teacher's attitudes towards TfU in other schools in Singapore which have adopted the framework. A comparative study would provide insights on the factors and rates of diffusion of curriculum innovation in schools operating in the local context.

However, a typical challenge faced by any researcher is whether the success of an innovation can be replicated to other teachers and schools to achieve scale. One issue faced in such situations is the tension between the desire to scale effective practice, on the one hand, and issues of adaptation and customization on the other (Honey & McMillan-Culp, 2000). Successful implementations in selected cases may not guarantee similar accomplishments to extended teachers and schools as the context, resources and operating environments may vary considerably.

To add more value to the research data gathered, a follow-up study could include a qualitative component to aid targeting specific areas where attitude to TfU and barriers to use are more problematic. A qualitative study using detailed case studies to follow up on the results obtained from the survey could yield a clearer picture of teachers' attitudes towards TfU in Victoria School. It is possible that interviewing and observing teachers would reflect an intensification of their daily work. It could provide explanations for the choices teachers make about adopting or rejecting the use of TfU in their teaching. The reasons to the mechanical and perfunctory use of the TfU, could be established in it may perhaps be attributed to the fact that teachers are overworked, overloaded and that they just did not have the time to be more responsive to the school's intentions to adopt the TfU framework as a curriculum innovation.

Results of the barriers that teachers perceived to exist in their institutions could lead to further investigation on how to develop solutions for overcoming these barriers. Barriers that exist need to be minimized, if not eliminated. It is suggested that school administrators could use the barriers mentioned in this research as a set of guidelines to see whether barriers do exist within the school. If it is discovered that the barriers do exist, school leaders can offer suggestions to the Ministry of Education to help overcome them or request for more resources to be channeled to alleviate the problem(s).

It would also be interesting to do a further study on the professional development needs of the teachers and ascertain if the sense of intensification that teachers feel could be due to the fact that very little has come their way in terms of comprehensive training and continuous on-site support to help them deal with the pressures of classroom implementation. It would help answer questions which this study did not consider, namely, would sustained instructional support, affect teachers attitudes towards using TfU in their teaching? The debilitating effect of a lack of support, becomes even more important when one considers the warning by Huberman and Miles (1984: 23) that " … large-scale, change-bearing innovations lived or died by the amount and quality of assistance that their users received once the change process was under way".

The study as a whole provides useful information that could be used for further investigation on what consensus teachers have about using TfU in their teaching, their attitudes, as well as, research focusing on what types of support are needed to achieve acceptable use of TfU in teaching.

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