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Intention to Train Tertiary Vocational Education in Animation and Visual Effect: Extended Theory of Planned Behavior

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Abstract

The purpose of this analysis is to examine the intention to study animation and visual effects in one-year programs using the extended theory of planned behavior (TPB) that establishes the characteristics of the program as a background variable. The background factor uses the composite model as an emergent variable, while all the others use latent variables as a common factor model in the partial least square structural equation model. The 606 sample sizes were gathered in the provinces which experienced a lower pandemic during COVID-19. The results suggest that animation and visual effects programs have a positive relationship with attitude, subjective norms, and perceived behavioral control, but no significant relationship with intention to study animation and visual effects. The attitude and subjective norms were a significantly related to the intention to study animation and visual effects in a one-year program, while perceived behavioral control did not have significant relation. This circumstance, however, increases the attractiveness of developing these types of programs at certain Rajabhat universities. There are some considerations that should be discussed in the development of tertiary vocational education of animation and visual effects, in Thailand.

Keywords

Intension to Train, Animation and Visual Effect, Tertiary Vocational Education, Rajabhat University, Theory of Plan Behavior

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Introduction

Digital disruption has become a major factor across a wide spectrum of industries worldwide (Deloitte, 2020). Thailand's digital development has been stunted, causing a scarcity of animation and visual effects staff. This problem can be remedied by digital transformation, through an effective solution of investing in human capital and collaborating with others on an organizational strategy (Deloitte, 2020). Presently, eight universities teach animation and visual effects leading to a four-year bachelor's degree. This field has only begun to open up, and universities have been developing general curriculums that are less specialized than what industries need. In other words, it is not enough. An effective alternate approach could be to train animation and visual effects practitioners in professional school, but such programs are not currently available in Thailand. In 2020, the world's top ten schools in visual effects consisted of five professional schools with just one year of specialized skills training, while the others offered a three-year bachelor's degree (The Rookies, 2020, December 07). Almost all of the world's top professional schools work out of animation and visual effects studios where the students can learn directly from experts and via an apprenticeship system which is generally more successful than the traditional teaching practice plus internship approach. An individual employed in this field relies more on specialized skills than on a degree. Thus, professional schools are more effective in increasing the number of specialists in the industry. Universities on the other hand require time and offer less specialized curricula, making them less efficient in increasing the number of industry specialists. Students should have the choice to spend less time and money to gain specialized skills over a period of about 1 year, and still earn equal or better wages than those spending 4 years on general graduate skills. This manuscript is part of a feasibility study project to establish a professional animation and visual effects program at some of the Rajabhat Universities in Thailand. The aim of this article is to analyze the students' intention to study animation and visual effects in a 1-year professional program using the theory of planned behaviour (TPB).

TPB is more commonly used to define behavioral intentions in a variety of areas, such as public health (Hosseini et al, 2021), tourism (Bae, & Chang, 2021), entrepreneurship (Bazan et al, 2020; Wathanakom et al, 2020), pharmaceutical education (Skoglund et al, 2020), environment (Mancha & Yoder, 2015; Maichum, Parichatnon & Peng, 2016), and business (Li & Jaharuddin, 2020). The TPB influences involved attitudes, subjective norms, and perceived behavioral control for determined intent behavior and actual behavior (Ajzen, 1991). All variables are behavioral variables that can be defined as latent variables. Ajzen and Fishbein (2005) created the extended TPB by adding background factors to the antecedent of attitudes, subjective norms and perceived behavioral control. they are personal, social and information factors. Many researchers have extended TPB by adding

variables at the same level as TBP factors (see, Hoeksma, Gerritzen, Lokhorst, Poortvliet, 2017, Shalender & Sharma, 2021; Tommasetti et al, 2018; Yadav & Pathak, 2017). Some scholars have extended the TBP with background factors (see, Maichum, et al., 2016; Mancha & Yoder, 2015; Prasetyo, Castillo,Salonga, Sia, Seneta,2020; Soria-Barreto, 2017). Wang, Fan, Zhao, Yang, and Fu (2016) have established extended variables for TBP factors at the same level as well as background or antecedent variables. All these researchers utilized expanded variables as latent variables. Generally, compositing, dynamic simulation, and 3-dimensional animation are the three cores animation and visual effects skills taught at professional schools. This study addresses background factors like the characteristics of a one-year animation and visual effects program, and the establishment of second-order constructs for the compositors, dynamic simulation artists and 3D animators. This is information which concerns the programs and as such is not a behavioral variable that should be created as a composite variable. That, to our knowledge, could be the first time that the TPB has been designed in this form. Moreover, there is relatively little research that relates TPB to "intention to train" in higher or technical education, most of which use "student choice".

The goal of this study is to examine the intention to study animation and visual effects in one-year programs using the extended theory of planned behavior, which uses program characteristics as a background variable. Professional education in animation and visual effects may also be more efficient than university education in terms of time and resources utilized by the country Thailand as it would raise the number of specialists in the sector to an adequate level. This research aims to examine the intention of students to study in a 1-year professional program using TPB. An objective model will be used to experiment with composite variables as a background factor for the extended TPB. The importance of education is that it will assist some Rajabhat universities in establishing this project so that students can enter the workforce sooner, increasing Thailand's competitiveness in this field. The justification for the study is that this type of curriculum does not exist in Thailand, and the number of students at Rajabhat University is falling. Rajabhat University should consider offering a new course option. This has the potential to benefit all students, universities, and the country as a whole.

The remainder of the paper consists of a literature review that identifies animation and visual effects studies, the planned behavior theory, and the latent and composite variables used to create the model. The methodology section discusses the population and sample, the questionnaire and measurements, and the partial least squares model. The results of the analysis are shown in the section after. The final section concerns discussion and conclusion.

Literature Reviews

Animation and Visual Effects Studies

The Rookies (2020, December 07), a website shows the best twenty visual effects schools in the word as of in 2020. The top ten ranking includes 5 professional school namely the Think Tank Training Centre (2), the Lost Boys School of Visual Effects (3), FX Animation (4), the SF Film School (7), and the 3dense Media School (10). These five professional schools are well known in the animation and visual effects industry and their training time is around one year. Professional schools can be more focus on certain specialized skill. For example, Think Tank Training Centre (2021, March 24) concentrates on animation while Lost Boy School of Visual Effect (2021, March 24) focuses on visual effects. The 12-month full time diploma program of the Think Tank Training Centre consists of three terms. Term 1 and 2 are related to animation such as, modelling, texturing, character and sculpting, while term 3 focuses on the production of real products for their own demo reels. The Lost Boy School of Visual Effect offers three programs. The first and second program are 12-month diplomas on compositing and technical director of effect (dynamic simulation artist), respectively. The third program is for lighting artists and is a five-month online program. The other professional schools are generally operating in the same way as almost all of them are animation and visual effects houses. Thus, the professional schools are able to create highly efficient animation and visual effects artists. Employers place a high value on applicants' skills and often require a demo reel to showcase their abilities during the job search. Animation and visual effects studios recruit people based on their skills. For example, Yannix (2021) recruited animators and compositing artists that did not have a degree but were skilled. A key qualification for animators or rotomation artists is experience in using 3d-rig in Autodesk Maya or similar software. Basic knowledge of nodal-based compositional applications, preferably Nuke or Fusion, is a primary requirement for a junior-level VFX compositor. Should they have advanced knowledge of the software then they can more easily reach mid-level positions as VFX compositors. According to JobHero (2018), while some employers hire visual effects artists based on experience alone, many still prefer applicants with a bachelor's degree. It's important to note, however, that the animation and visual effects industries value skills first and foremost. Even studios that require a college degree have high skill requirements for their employees.

Professional schools may devote more time to training in specialized skills than universities do. The curriculum of a four-year bachelor degree in visual effects in Thailand consists of 136-138 credit unit divided as such: general education 30 units, fundamental professional subjects 24 units, professional subjects 76 units, and optional subjects 6 units. They do a thesis or project that count for about 6 units in their 4th year. However, students will

only practice compositing for about 3-6 units, rotoscoping for 3 units, match moving for 3 units and dynamic simulation for 3 units. Generally, the total amount of time for learning a 3-unit subject is about 45 hours. If homework and for self-practice are included it will likely not exceed 200 hours. Animation artists can practice modelling, texturing, and charactering. University students may need to learn almost all of the skills of each field of visual effects or animation. In a professional school, the students can select compositing or dynamic simulation for a one-year training program which involves 120 hours per month (6 hours x 5 days x 4 weeks) or about 1,440 hours per year. Therefore, if a student knows their which skill area (e.g., compositing, dynamic simulation or animation) they prefer, they may pursue it at a professional school, thus saving them both time and money on specialization. On the others hand, the advantage of studying in a university is that the students will be more involved in team work and learn many more skills, thus possibly becoming a generalist.

The three main professional programs are compositing, dynamic simulation and 3dimension animation. Lost Boys School of VFX (2021, April, 28) show that compositing plays a crucial role in the creation of visual effects (VFX) for film, television and animation productions. The compositor blends the elements filmed during development with the computer-generated imagery (CGI) produced by other artists merging them seamlessly. Nuke is the primary program that compositors use in studios worldwide. The program for dynamic simulation artists is the same as effect technical directors offered by Lost Boys School of VFX. Dynamic simulation artists primarily produce physical effects such as fire, smoke, water and different forms of devastation (Lost Boys School of VFX, 2021, May, 26). Houdini is the main software program for this artist. The 3D animation artist is trained in modelling, texturing, sculpting and characterizing animation using the key software Maya and Zbrush.

Due to their direct contact with customers and industry needs, professional schools may operate at a higher capacity and efficiency and more accurately match business needs than universities. Students are able to concentrate on each specialized field, such as compositing, dynamic simulation, or 3D animation. They can train their skills using software that is used in real-world animation and visual effects studios. Many universities in Thailand use the software After Effect to teach compositing students even though studios normally use Nuke or node-based compositing software. Consequently, a student with the key skill of VFX compositing from a professional school might apply for a mid-level job, while a university graduate who learned compositing for 3-6 units using After Effects software might only be considered for a junior-level job.

Therefore, it might be beneficial to offer one-year professional courses in compositing, dynamic simulation, and 3-D animation at selected Rajabhat universities in Thailand. Rajabhat Universities are widespread in Thailand. Formerly known as Rajabhat

Institutes, they were initially set up as teaching colleges. In 2005, King Bhumibol Adulyadej granted them Rajabhat university instead of Rajabhat institute with the approval of Parliament. Many provinces have them, as there are a total of 38 universities. They offer bachelor's, master's and doctoral degrees, but the number of enrolment is decreasing sharply. This research is part of a feasibility study looking to establish a professional animation and visual effects program at some of the Rajabhat Universities in Thailand. The study is looking at the possibility of implementing such program by adopting a macro view, including marketing, production, management and cost benefit analysis. This research is part of the marketing portion which investigates the students' intentions to study animation and visual effects in a 1-year professional program using the TPB.

A student's choice of major is usually influenced by a variety of factors, including the specific subject or profession he or she wishes to pursue after graduation. This concept has been referred to as the course of study by Coccari & Javalgi (1995) and the availability of the major by Price, Matzdorf, Smith, & Agahi (2003). The construction of the hypothesis reveals the interaction between the animation and the visual effect program and attitude, subjective norm, perceived behavioral control and the study intention as follows;

Hypothesis 1: The animation and visual effects program has a positive impact on the student's attitude toward the intention to train in the field of animation and visual effects.

Hypothesis 2: The animation and visual effects program has a positive impact on students' subjective norms for deciding to study in the field of animation and visual effects.

Hypothesis 3: The animation and visual effects program has a positive effect on the student's intention to train in the field of animation and visual effects.

Hypothesis 4: The animation and visual effects curriculum is positively associated with students' perceived behavioral control over their intention to train in the field of animation and visual effects.

Theory of Plan Behavior

The theory of planned behavior (TPB) originated as the theory of reasoned action (TRA) in 1980 to forecast an individual's intention to engage in a certain behavior at a given time and place. The principle was structured to explain all the patterns of people's capacity to maintain self-control. Ajzen and Fishbein (1978) introduced the TRA using attitudes and norms for performing intensity and behavior. In TPB, to study intention and behavior, Ajzen (1991) applied perceived behavioral control to the TRA. Therefore, TPB uses attitude, subjective norm and perceived behavioral control to study intention and behavior. There are no professional animation and visual effects schools in Thailand and so we cannot investigate the behavior vis a vis this program. The intention to perform a behavior rather

than an attitude control? is the closest cognitive antecedent to real behavioral performance (Fishbein & Ajzen ,1975). The researcher should then be able to forecast specific behaviors with considerable precision from the intention to participate in the behavior under consideration (Ajzen & Fishbein, 2005). In TPB, the behavioral intention is the most proximal determinant of actual behavior (Guerin & Toland, 2020).

The basic principle of the TPB is that a person's intention to conduct an action is an immediate determinant of his or her planned behavior. The purpose of the TPB is defined using three aspects: attitude toward the behavior, subjective norm concerning the behavior, and perceived behavioral control (Ajzen, 2020). In other terms, the intention is based on the attitude towards behavior, the subjective norm and the perceived behavioral control (Guggenhein, Taubman-Ben-Ari, Ben-Artzi, 2020). Ajzen (1991) describes attitude as referring to perceived behavioral effects, social norm refers to perceived societal expectations of adherence to behavior, while perceived behavioral control is the degree to which an individual feels capable or incapable of acting.

Behavioral attitudes are generated from behavioral beliefs and the appraisal of behavioral consequences that an individual favorably or unfavorably performs. Positive behavior encourages behavioral efforts, whereas pessimistic behaviors suppress positive behavior (Ajzen, 1991). Students' attitudes are key factors that have an effect on the level of goal-setting, their problem-solving abilities, their confidence and motivation to study, and their academic performance. Attitude is one of the most widely explored variables in the area of study aimed at recognizing behavioral intentions (Tommasetti et al, 2018). Attitude leads to the overall assessment of specific behaviors (Kim and Han 2010). Many researchers (Tsen, Phang, Hasan & Buncha, 2006; Kim & Han, 2010; Shalender & Yadav, 2018) found attitude and behavioral intention to be related. Attitude has a clear part to play in the decision to accept a certain behavior (Maichum, Parichatnon & Peng, 2016). To explain the formation of an attitude towards a behavior, the TPB relies on an expectation-value formulation (Ajzen, 2020). Given this framework, behavioral intention is a feature of behavioral attitude and is used to construct the hypothesis as follows;

Hypothesis 5: The behavioral attitude of the student has a positive effect on the student's intention to study in the field of animation and visual effects.

Social norms apply to an individual's desire for a community to act in a socially appropriate manner (Ajzen, 1991). It refers to perceived social/peer pressure from others who are important to a student (Fichten,et al, 2014) encouraging them to engage in certain behaviors. Students decide whether to study in part on the basis of their peer choice, which involves siblings, friends, relatives, teachers, and those who play a significant role in their life (Kusumawati, Yanamandram, and Perera, 2010). In Thailand, secondary school teachers may have a significant impact on student decision-making (Pimpa and Suwannapirom, 2008).

As Shanka, Quintal, and Taylor (2005) point out, the decision to pursue higher education can be significantly influenced by parents. In order to help in the choices to study, families try to expand their financial power, information, expectations, persuasion and competition (Aydin, 2015). The available financial assistance from one's family can strongly influence one's decisions concerning their academic future (Pimpa, 2004; Kusumawati, Yanamandram, & Perera, 2010). Fletcher (2012) identifies the social norm for high school students called an "acceptable choice". Social norm is the foundation to intention Wiriyapinit (2007) has shown that the family values of parents in Thailand have been related to purchasing intentions. Thus, the hypothesis of the relationship between social norm and the intention to study animation and visual effects may be built as follows;

Hypothesis 6: The societal norm influence on the student's study has a positive effect on the student's intention to study in the field of animation and visual effects.

Perceived behavioral control may be the most important feature of TPB as it is the element applied to theoretical reason action (TRA) to make it be TPB (Ajzen, 1991) in order to overcome the TRA's restriction (Leone, Perugini & Ercolani, 1999). The idea of perceived behavioral control has been introduced in an effort to cope with circumstances in which individuals might lack full volitional control over the behavior of concern (Ajzen, 2002). Ajzen (2002) observed that the fundamental concept of perceived behavioral control, as commonly assessed, consists of two parts, self-efficacy and controllability, which can also reflect a belief in the presence of both internal and external factors. Internal controls, such as self-confidence and skill, and external controls, such as money and time, promote the performance of certain behaviors by individuals (Taylor & Todd, 1995). Perceived behavioral control is assumed to moderate the effects of attitude and subjective norm on intent, and actual behavioral control is assumed to moderate the effect of intent on behavior (Ajzen, 2020). Furthermore, perceived behavioral control is assumed to directly incorporate all intents and behaviors and, the greater the perceived behavioral control, the more positive the behavioral intention and the more likely the behavioral performance (Leone, Perugini & Ercolani, 1999). Many studies (e.g. Lin, 2010; Blanchard et al., 2008) have found that perceived behavioral control has a significant effect on behavioral intent. Thus, the hypothesis of the relationship between perceived behavioral control and the intention to study animation and visual effects, can be constructed as follows;

Hypothesis 7: The perceived behavioral control of the student's decision to study has a positive effect on the student's intention to study in the field of animation and visual effects.

Latent and Composite Variables of PLS-SEM

Generally, all variables in TPB, including fundamental factors and extended variables, are constructed as latent variables attributable to all behavioral variables, as is the case in all related literature. The characteristics of the animation and visual effects program are constructed as a composite variable in this study. In addition, the second-order construct of the three-dimensional character of the animation and visual effects program is created utilizing the formative-formative approach (Ringle, Sarstedt & Straub, 2012) or composite of composite approach (Schuberth, Rademaker & Henseler, 2020). In the partial least square structural equation model (PLS-SEM), the factor model implies that the unobserved variables (common factor) and individual random errors can be completely represented by the variance of a set of indicators for the conventional behavioral analysis model (Henseler, & Dijkstra, 2015). In order to do proper measurements, reflective estimation models with consistent PLS are created using "Mode A consistent" as a weighting scheme in ADANCO. In this analysis, the character of the animation and visual effects program is not a behavioral variable composed of the respective indicators that are constructed as a composite model that can be established on the basis of Henseler (2017). The composite model is also a proxy for the empirical description studied (Rigdon, 2012; Tenenhaus, 2008), which is the linear combination of their respective indicators as a formative structure (Henseler et al., 2014). The composite model does not impose any constraints on the covariance between measures of the same construct (Henseler, & Dijkstra, 2015) and has less restrictions than the factor models. This normally leads to higher overall model fit (Landis et al., 2000). Latent and composite designs vary in the nature and application of measurement metrics. Structural equation analysis methods can be separated into three models, namely common factor model, composite model and causal formative model (Bollen & Bauldry, 2011; Henseler, 2017; Lee, Cadogan & Chamberlain, 2013; Massiera, Trinchera & Russolillo, 2018; Schuberth, 2020). The common factor model is calculated as reflective, whereas the composite model and the causal formative model are measured as formative. Rigdon (2016) built a common factor model and a causal formative model using a factor-based approach which was and separated as a common factor with reflective indicators and a common factor with formative indicators. As a consequence, the third model is a composite model where PLS-SEM can do calculation in a common-factor, causal formative and composite model.

In a common-factor model, the variables observed are dependent on another variable that is not observed by the reflective measurement, which may be the standard in factor-based SEM. Müller, Schuberth & Henseler (2018,p253) described five of its characteristics: construct causes indicators or causal relationships, high correlations between the indicators are expected, exchanging the indicators does not alter the value of the construct, the estimate of the residual variance as an error is done at the stage of the

manifest variable (Massiera et al, 2018), and the scale score does not represent the construct properly. Bollen (2011) indicated that indicators can be interchanged if they are closely loaded, reliable and valid. In contrast, whether the indicators in or out of the model change or do not change in meaning (Bollen & Bauderly, 2011) is the most important variable in behavioral science studies, even though there are only two indicators that can completely represent the meaning of the latent variables (Henseler, 2017). The measurement criteria are comprised of internal consistency, indicator reliability, convergent validity and discriminant validity.

In the causal formative model, the indicators are not conceptual, but control variables to avoid bias in the estimation of the relationship between observations and latent variables (Bollen & Bauder, 2011). The indicators are the multi-regression system's dependent variable and the latent variables are independent variables estimated by the residual variance as a structural error of the latent variables stage (Massiera et al, 2018). This distinguishes it from a composite model that does not have an error term attributable to indicators that completely describe the latent variables. The indicator does not correlate with other indicators whether it induces insignificance in others or negative signals or theoretical errors. Causal formative models have potential drawbacks that Rönkkö et al (2016) have identified as biases that should not be used (Rigdon, 2016). Aguirre-Urreta Rönkkö & Marakas (2016), Lee Cadogan & Chamberlain (2013) found superfluous results by eliminating only one indicator that would influence the main character of the model and change the context of the latent variable (Bollen & Lennox, 1991) and thus would not function. All indicators adopt one meaning in latent variables (Bainter & Bollen, 2015) if any of the indicators are lost from the model causing an increase in the error of estimation (Henseler, 2017). This leads to the confounding interpretation that the latent concept is different from the metrics under which the nominal and the empirical descriptions vary. However, if a researcher needs to use a causal formative model, with multiple indicators, a multiple cause model (MIMIC) can be used instead (Benitez, Henseler, Castillo & Schuberth, 2020; Henseler, 2017).

In a composite model, the design is different from the common factor variable in behavioral and social sciences in that it represents artifacts that lead to the creation of measurement (Müller, Schuberth & Henseler, 2018). The phenomenon behind the science is the relationship between the indicator and the composite variable, where the main characteristics of a composite model are the indicators that make up the construct. High correlations between indicators are common but not required, and swapping indicators can change the meaning of the construct. Measurement error is not explicitly accounted for and the scale value adequately represents the construct (Müller, Schuberth & Henseler, 2018, p. 253). The composite model has a few restrictive assumptions between the indicators, they

can be of any value for which the internal consistency means none. The most significant limitation is that all interactions between indicators with different construct can be explained as the result of the inter-constructed correlations and the corresponding indicator loads (Henseler, 2017). The quality parameters of the composite model are nomological validity, reliability, weight relevance and multicollinearity of indicators that are closely associated with the same causal formative criteria.

PLS-SEM Assessment

The PLS-SEM estimate consists of model fit, measurement and structural model estimation. For the overall model fit assessment, the measurement calculates the difference between the empirical and the model-implemented variance-covariance matrix of the variables to be observed (Hensler & Schubert 2020). This can be used to gather scientific data against a specific model that examines whether the constraints enforced by the model are justifiable (Henseler & Schubert, 2020). If the model is consistent with the truth, the data should be consistent with the model, which means that the model corresponds to the reality of the model (Bollen, 1989). Model fit quality uses bootstrap-based tests (Beran & Srivastava, 1985). Henseler & Dijsktra (2015) use three model fit indices, namely the standardized root means square residual (SRMR), the squared Euclidean distance (d_{ULS}), and the geodesic distance (d_G). Fit indices are estimated using SRMR with a cut-off value of 0.08 (Hu & Bentler, 1999) which seems to be optimal for SEMs based on variance (Henseler & Dijsktra, 2015).

For the measurement model of a common factor model, the measurement criteria are internal consistency, indicator reliability, convergent validity and discriminant validity. The internal consistency criteria are Cronbach's alpha, Dijkstra-Henseler's rho (ρ_A) and Jöreskog's rho (ρ_c) which should be more than 0.70 (Henseler, Hubona, & Ray, 2016). The indicator reliability and their square root, or loading, should be equal to 0.50 and 0.708, respectively (Henseler, Hubona, & Ray, 2016). The convergent validity criteria are the average variance extracted (AVE) and should be greater than 0.50 (Fornell & Larcker, 1981). The discriminant validity criteria are the heterotrait-monotrait (HTMT) and should be no more than 0.85 (Henseler, Ringle, & Sarstedt, 2015). The composite model criteria are comprised of the nomological validity, reliability, and weights (composition) (Henseler, 2 0 1 7). The nomological validity considers the significance, the sign and the size of the estimated weights to be measured and is related to the researcher's theory. In addition, the relationship between the composite variables should be consistent with the researcher's assumptions (Schuberth, 2020). The reliability of the composite is model equal to 1 if it is measured using perfectly observable variables, and there is no random error of measure. If the indicators contain an error in random measures, the composite model has an incomplete reliability that needs to be measured (see Henseler, 2017, p184). In composite model, weight should also

be considered in terms of size, sign, significance level and multicollinearity (Henseler, 2017) and the variance inflation factor (VIF) should not exceed 5 (Benitez, et al, 2020, Hair et al, 2016). However, if the weight estimates are subject to multicollinearity, it is important to inspect the interaction patterns of the variables within the variable components (Schuberth, 2020).

In a structural model, the parameters are the coefficients of determination (R^2 values), the size of the effect (f^2) and the coefficient of path. The coefficient of determination value can be 0.25, 0.50 and 0.75 for small, medium and high, respectively. Cohen (1988) notes that side effect values above 0.35, 0.15 and 0.02 can be called high, moderate and weak. The size and the sign of the path coefficient also demonstrate the quality of the structural model since a negative sign means that the increase in the independent variable is followed by a decrease in the dependent variable (Henseler, 2017).

The Conceptual Framework

The conceptual framework used in this study is TPB which main variable using common-factor or latent variables. The background variables are the characteristics of a one-year animation program, and the certificate program is the second-order construct with the dimensions of the character of a 3D animator, compositor, and dynamic simulation artist, which is an artifact or composite variable. In Figure 1, the hexagons represent the emergent variables, whereas the ovals represent the latent variables. Based on the literature and hypotheses, the following conceptual framework may be created:

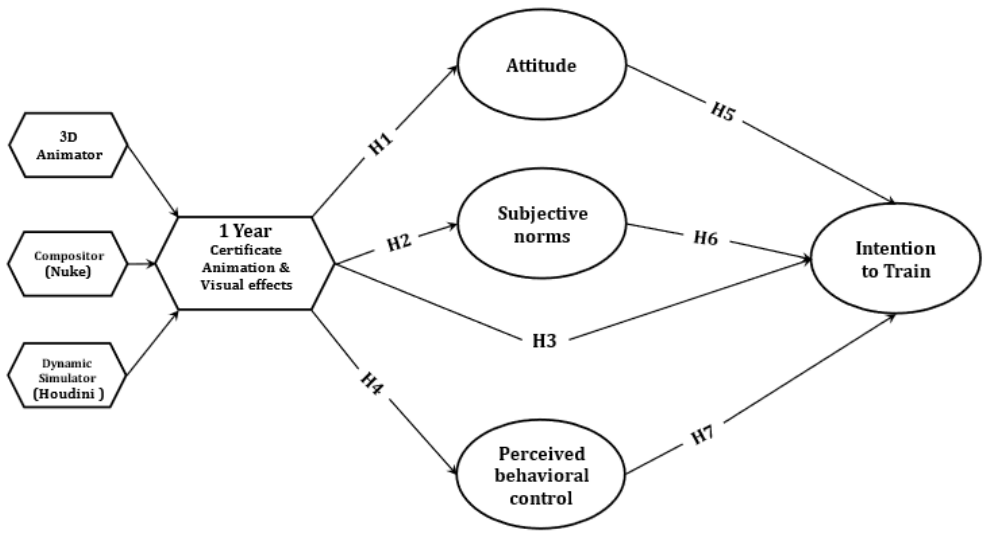

Figure 1 The Conceptual Framework

Methodology

Population and Sample

This program is open to all Thai citizens who have completed their upper secondary education. Data from three academic years of upper secondary school were collected to represent the population of this study. Many of the students who continue into higher or technical education, however, are students who have finished senior high school, and so that is where the data was gathered. The sample size was based on Soper (2021) using five metrics: effect size (0.20), statistical power (0.80), number of latent variables (7), number of observed variables (33) and probability level (0.05). The result is 423 individuals using this scenario estimate. The study gathered 606 for the smallest sample coverage. When all indicators are constant, the 606 samples size raises the statistical power from 0.80 to 0.945. However, due to the COVID-19 pandemic, data were collected from schools in Kamphaeng Phet, Phitsanulok, and Pathum Thani provinces using paper questionnaires, as they were readily accessible.

Measurement

For the first-order construct, the study's key construct consists of four latent variables and three emergent variables. Each of the latent variables has three indicators, while each of the emergent variable has seven. For the second-order construct, the three emergent variables combine to produce one emergent variable that is the information of a one-year animation and visual effects program using formative-formative or composite of composite. Thus, there are 33 indicators in the seven-level rating scale as in TPB fashion (see appendix).

The analysis was done using ADANCO 2.2.1 which is a program for partial least squares structural equation models. The latent variables are represented by oval figures while the emergent variables are represented by hexagons using the construct type in the latent variables and the emergent variables, respectively. The weighting scheme uses mode A consistent with the latent variables, which is a common factor variable. Mode B can be used as composite or emerging variables if VIF is less than 5 or has no multicollinearity. Additionally, if VIF is more than 5 and the indicators are considered to have problematic multicollinearity (Benitez et al, 2020) then it should be used in mode A. the second-order construct, use the formative-formative with the two-stage approach of Becker, Klein & Wetzels (2012).

Results

Sample Information

Table 1 shows that the ratio of women to men is approximately 63.50 percent and 36.50 percent of the sample, respectively, with 70 percent of the sample aged 17 to 18. They were studying grade 10, 11 or 12: about 29 percent, 32 percent, and 38 percent, respectively, with 68 percent of them studying in science-mathematics. The monthly family income was equivalent to or less than 20,000 baht in about 40 percent of the cases, and between 20,001 and 40,000 baht in about 29 percent of the cases.

Table 1 Bio Data of the Sample

Variables	Meaning	Frequency	Percent
Gender	Women	385	63.50
	Men	221	36.50
Age	Below17	167	27.60
	17	210	34.70
	18	212	35.00
	Higher 18	17	2.80
Education	Grade 10	177	29.20
	Grade 11	195	32.20
	Grade 12	234	38.60
Major	Science-Mathematics	412	68.00
	Art- Mathematics	58	9.60
	Art-Language	97	16.00
	Other	39	6.40
Family Income	Equal or Below 20,000 Baht	244	40.30
	20,001-40,000 Baht	176	29.00
	40,001-60,000 Baht	91	15.00
	60,001-80,000 Baht	41	6.80
	Higher 80,000 Baht	54	8.90

The measurement model in the first-order construct consisted of three composite models and four PLSc. The second-order construct consisted of a composite model and four PLSc, and it was created with a composite of composite or a formative-formative model with a disjointed two-state approach (Becker et al. 2012). The quality of the latent variable or

PLSc model measured the internal accuracy, indicator reliability, convergent validity, and discriminant validity. The emergent variable or composite model was needed to measure the nomological validity, reliability, and weights (composition) (Henseler, 2017). The output shows both first- and second-order constructs. The first-order construct investigated how well the indicators organized their constructs, which was measured by model fit indexes. Thus, the first-order construct illustrates the total model fit as well as the estimation model for both latent and emergent variables. The second-order constructs were used to analyze the relationship between the constructs that can only be showed by the structural model. However, this analysis demonstrates that a composite model with a formative-formative form and a disjointed-two-state approach is capable of generating a total model fit index. As a result, the total model fit indexes are available in the second-order construct.

First-order Construct

Total Model Fit

Table 2 reveals that at bootstrapping percentile 99, the SRMR, d_{ULS}, and d_G values are all higher than the saturated model assessment, suggesting that the inference is invalid. However, SRMR is less than 0.08, which is appropriate in terms of total model fit (Hu & Bentler, 1999).

Table 2 Overall Model Fit

Discrepancy	Saturated model fit evaluation		
	Value	HI_{95}	HI_{99}
SRMR	0.047	0.024	0.026
d_{ULS}	1.173	0.313	0.356
d_G	0.891	0.299	0.326

Measurement Model

Table 3 shows the results of the four latent variables. The internal consistency shows with probability high that the indicator attitude has a rho A (ρ_A), rho C(ρ_c), and alpha (α) all equal to 0.912. The indicator social norm has 0.873 for all three parameters. Perceived behavioral control has 0.888, 0.880 and 0.876 for rho A (ρ_A), rho C(ρ_c), and alpha (α) respectively. Intention to train has 0.946, 0.945 and 0.945 for rho A (ρ_A), rho C(ρ_c), and alpha (α) respectively. All four latent variables contain loadings over 0.708, ranging from 0.735 (PBC1) to 0.947 (INT3), revealing that all of them have indicator reliability. The convergence validity is showed by the average variance extracted (AVE) with all of the latent variable having values higher than 0.50, with values ranging between 0.694 (Perceived

behavioral control) and 0.851 (Intention to train). The results show that all of the latent variables have convergence validity. The results of the HTMT show that all variables are below 0.85 indicating proper to discriminant validity. The results reveal that the indicators are well-organized for all four latent variables.

Table 3 Measurement Model of Latent Variables (PLSc model)

Indicator	Loading	Dijkstra-Henseler's rho (ρ_A)	Jöreskog's rho (ρ_C)	Cronbach's alpha(α)	Average variance extracted (AVE)
Attitude		0.912	0.912	0.912	0.775
ATT1	0.902				
ATT2	0.864				
ATT3	0.875				
Social norm		0.888	0.880	0.876	0.711
PBC1	0.735				
PBC2	0.905				
PBC3	0.879				
Perceived behavioral control		0.878	0.871	0.872	0.694
SN1	0.771				
SN2	0.801				
SN3	0.920				
Intention to train		0.946	0.945	0.945	0.851
INT1	0.936				
INT2	0.883				
INT3	0.947				
Discriminant validity (HTMT)		Attitude	Perceived Behavioral Control	Social norm	Intention to train
Attitude					
Perceived behavioral control		0.782			
Social norm		0.744	0.843		
Intention to train		0.742	0.758	0.841	

Table 4 shows the emergent variables whose nomological significance is confirmed since all of the network connections are provided by a single model evaluation (Hagger, Gucciardi & Chatzisarantis, 2017). When the t statistic of each indicator is greater than 1.96, all weighting is significant. All indicators have a multicollinear variance factor (VIF) of less than five, with the highest value being 4.007 (DS3) and the lowest value being 1.678. (ANI7). As a result, indicators of each emergent variable are very similar. Consequently, the algorithm for emergent variables and mode B needed to be included in this analysis. The results indicate that the indicators for each emergence variable are well organized.

Table 4 Measurement Model of Emergent Variables (Composite model)

	Weighting	Loading	VIF	t-statistics (mode A)
Animation				
ANI1	0.191	0.834	2.825	27.612
ANI2	0.170	0.786	2.439	24.349
ANI3	0.182	0.839	2.698	28.964
ANI4	0.178	0.837	2.870	28.276
ANI5	0.190	0.857	3.253	29.531
ANI6	0.160	0.764	2.152	22.015
ANI7	0.170	0.705	1.678	19.165
Compositing				
COM1	0.170	0.829	3.231	29.694
COM2	0.177	0.859	3.695	33.583
COM3	0.175	0.864	3.232	34.071
COM4	0.171	0.869	3.388	33.492
COM5	0.179	0.872	3.652	32.828
COM6	0.166	0.824	2.686	32.063
COM7	0.156	0.728	1.773	20.051

Table 4 Measurement Model of Emergent Variables (Composite model) (continued)

	Weighting	Loading	VIF	t-statistics (mode A)
Dynamic simulation				
DS1	0.166	0.845	3.424	33.069
DS2	0.171	0.840	3.279	33.753
DS3	0.175	0.894	4.007	39.132
DS4	0.176	0.889	3.808	37.273
DS5	0.169	0.883	3.970	37.573
DS6	0.167	0.856	3.072	33.048
DS7	0.150	0.735	1.942	19.763

Second-Order Construct

Total Model Fit

The total model fit of the second-order construct is shown in Table 5. Although all of the SRMR, d_{ULS}, and d_G values are greater than the value of the saturated model fit at bootstrapping percentile 99, the SRMR is less than 0.08, which is consistent with the total model fit.

Table 5 Overall Model Fit

Discrepancy	Saturated model fit evaluation		
	Value	HI_{95}	HI_{99}
SRMR	0.026	0.016	0.017
d_{ULS}	0.081	0.030	0.036
d_G	0.124	0.055	0.063

Structural Model

Table 6 and Figure 2 display the structural model's results, which indicate seven directions from the animation and visual effects program to the main construct of the theory of planned behavior. There are two non-significant paths from animation and visual effects to intention to train, and from perceived behavioral control to intention to train. Based on the t statistics, there are three very strong paths: animation & VFX to attitude, animation & VFX to social norm and animation & VFX to perceived behavioral control. Consequently, five of the seven hypotheses are accepted, while the remaining two are not.

Table 6 Structural Model

Effect	Beta	T Value	P Value	Cohen's f^2	R^2	Hypothesis test
H1: Animation & VFX -> Attitude	0.766	33.909	0.000	1.424	58.70%	supported
H2: Animation & VFX -> Social norm	0.676	20.821	0.000	0.842	45.70%	supported
H3: Animation & VFX -> Intention to train	0.054	0.992	0.321	0.004	74.20%	Not supported
H4: Animation & VFX -> Perceived Behavioral Control	0.779	25.630	0.000	1.546	60.70%	supported
H5: Attitude -> Intention to train	0.215	3.069	0.001	0.055	74.20%	supported
H6: Social norm -> Intention to train	0.631	7.265	0.002	0.424	74.20%	supported
H7: Perceived Behavioral Control -> Intention to train	0.019	0.190	0.850	0.019	74.20%	Not supported

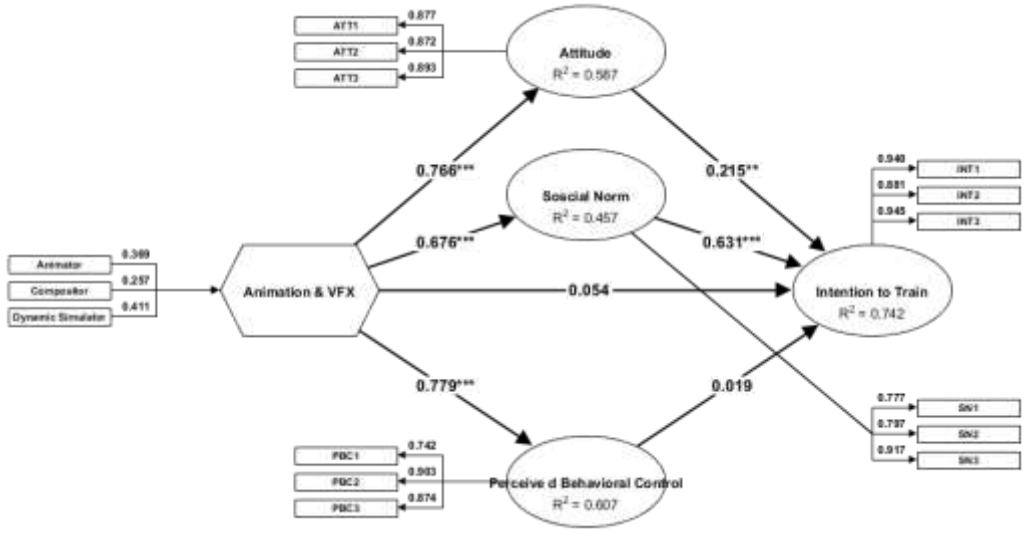

Figure 2 Structural Model

Indirect Effect

Table 7 shows the parallel indirect effects of the animation and visual effect programs on the intention to train in this program, which are significant. This indicates that students' decision to train is influenced indirectly through the Theory of Planned Behavior (TPB), as demonstrated by the calculated indirect effect of 0.606 derived from [(0.766 * 0.215) + (0.676 * 0.631) + (0.779 * 0.019)].

Table 7 Indirect effect

effect	Original coefficient	Standard error	T Value	P Value
Animation & VFX -> Intention to train	0.606	0.050	12.230	0.000

Discussion and Conclusion

Summary

The overall results show that students do intend on pursuing tertiary vocational education in 3D animation, compositing, and dynamic simulation. There are three significant connections between the background variable and the three TPB aspects. The characteristics of animation and VFX courses can influence attitudes, social norms, and perceived behavioural control, all of which have an indirect impact on student intention to train. This study demonstrates that the composite model is well organized as an antecedent factor of three

TPB aspects. This study used a second order construct to establish a clear relationship between the composite background and the three TPB aspect variables. It differs from all other works of literature. Such as, Mancha and Yoder (2015) used interdependent and independent self-construal as background variables in a latent model with first order construct and discovered that they were all significant to three aspects of TPB. Prasetyo et al (2020) used understanding of COVID-19, perceived vulnerability, and perceived severity as background variables in a first-order construct and latent model, but understanding of COVID-19 as an antecedent variable of perceived vulnerability and perceived severity. There are eleven paths between background variable and three aspects variable of TPB which found seven paths are significance. Maichum et al. (2016) used environmental concern and knowledge as background variables and first-order latent model constructs. There are eight paths between them, with six having significance.

Practical Implications

The students who showed an interest in training were identified by the following factors: a desire to have a career as an animator or visual effects artist, encouragement by family, friends, and teachers, and being inspiring by Thai Hollywood filmmakers. The three professional animation and visual effects courses, on the other hand, had an insignificant effect on the desire to train. Almost all professional courses in animation and visual effects work in collaboration with studios that work on real-world scenarios. The staff is committed to the actual projects, which involve the use of cutting-edge equipment, materials, and software allowing students to gain knowledge of the issues by creating real project for real consumers. This is in contrast to a bachelor's degree at a university, where students are required to complete an internship at an industry studio during their final semester. So, how can tertiary vocation education in animation and visual effects be constructed? Universities should create studios similar to those used in real-world situations for servicing the customers. Students can learn from specialists who working in the real industry. Another way would be for universities to collaborate with renowned studios to provide courses in animation and visual effects. However, it is obvious that a four-year bachelor's degree in animation and visual effects would be less cost-effective compared to a one-year professional specialization. However, one of the benefits is that students could gain more teamwork skills in class, which is critical for real-world practice in animation and visual effects studios. One-year tertiary vocational education in animation and visual effects would place a greater emphasis on specialized preparation but less on teamwork skills, which is emphasized in university programs.

Theoretical Implications

This is the first of a variety of articles demonstrating how to use emergent variables as an antecedent to the TPB's base variables, particularly when a second-order construct is created using a disjointed two-stage approach and a formative-formative type. The hierarchical construct model can minimize the paths between the background variable and the TPB's aspect, resulting in a more exact and clear relationship between them. As a result, this theory is capable of producing total model fit at both stages, which is not possible by using repeated indicators and a two-stage approach for latent variables. Using emergent variables as an antecedent of TPB allows for the use of a larger range of variables, as emergent variables have a broader scope than latent variables, which are more based on behavior. That creates an environment allowing for the development of a new TPB theory.

Limitations and Directions for Future Research

Although the report's main conclusions include precise answers to specific questions, certain limitations must be considered. Perceived behavioral regulation has no significant relationship with the intention to train in the field of animation and visual effects in this research. Perceived behavioral control in the Theory of Planned Behavior (Ajzen, 1991) may be the most important element, as it enables the theory to overcome the restrictions of the Theory of Reasoned Action (TRA) (Leone, Perugini & Ercolani, 1999). Thus, future studies on animation and visual effects using TPB should examine the moderating effect of attitude and subjective norm on intention behavior and actual behavior (Ajzen, 2020).

Almost all professional animation and visual effects school provide courses aiming to improve the skill involved in all three main area covered in this research. On the other hand, the PIXL VISN course in Germany (PIXL VISN, 2021, June, 05) is unique in that it covers all skills in 15 months and is divided into five quarters. There are more than three sets of skills, and students choose one by focusing on a selected project, which will run from quarter three to quarter five. All of the trainers are experienced as artists at renowned studios and have worked on films, and the training environment is studio-like. However, tuition is around 20,000 EUR per year. Our project will improve the trainers' skills by sending them to India, where tuition is less than 5,000 EUR per year.

Conclusion and Recommendation

The animation and visual effects industry is more interested in hiring people with specialized skills rather than degrees. Eight universities in Thailand offer a four-year bachelor's degree in animation and visual effects with the aim of producing generalists. Thailand, in comparison to Canada, India, and the rest of the world, lacks studios and technical schools that produce specialists in a single year. The findings indicate that Thai students are interested in pursuing tertiary vocational education in 3D animation,

compositing, and dynamic simulation. This article proposes that the emergent variables in the animation and visual effects curriculum used as a second-order construct of the three professional courses: 3D animation, compositing, and dynamic simulation, serve as an antecedent variable for the TPB for intention to train. The second-order variable is constructed using a disjointed two-stage approach, as well as a formative-formative type and mode A capable of generating total model fit for both levels. Additionally, the second-order emergent variable is sufficiently defined to serve as an antecedent variable in the TPB model. Thus, an incredible new theory based on extended theory of planned behavior can be developed. However, it is the insignificance of the presumed perceived behavioral control that should be studied in the future in order to determine the moderating effect of attitude and subjective norm on intention and actual behavior. Finally, tertiary education program in animation and visual effects can be established in collaboration with some renowned studios to ensure that high instructor standards are maintained.

For recommendation, based on their attitude and usage of social norms, students will attempt to train in animation and visual effects, according to this study. Furthermore, when behavioral control perceptions are used as a mediator, there is no effect on training intention.

References

Aguirre-Urreta, M. I., Rönkkö, M., & Marakas, G. M. (2016). Omission of causal indicators: Consequences and implications for measurement. *Measurement: Interdisciplinary Research and Perspectives, 14*(3), 75-97.

Ajzen, I. (1991). The theory of planned behavior. *Organizational behavior and human decision processes, 50*(2), 179-211.

Ajzen, I. (2002). Perceived behavioral control, self-efficacy, locus of control, and the theory of planned behavior 1. *Journal of applied social psychology, 32*(4), 665-683.

Ajzen, I. (2020). The theory of planned behavior: Frequently asked questions. *Human Behavior and Emerging Technologies, 2*(4), 314-324.

Ajzen, I., & Fishbein, M. (1978). Use and misuse of Bayes' theorem in causal attribution: Don't attribute it to Ajzen and Fishbein either. *Psychological Bulletin, 85*(2), 244-246.

Ajzen, I., & Fishbein, M. (2005). The Influence of Attitudes on Behavior. In D. Albarracín, B. T. Johnson, & M. P. Zanna (Eds.), *The handbook of attitudes* (p. 173–221). Lawrence Erlbaum Associates Publishers. Mahwah, NJ.

Bae, S. Y., & Chang, P. J. (2021). The effect of coronavirus disease-19 (COVID-19) risk perception on behavioural intention towards ‘untact’tourism in South Korea during the first wave of the pandemic (March 2020). *Current Issues in Tourism*, *24*(7), 1017-1035.

Bainter, S. A., & Bollen, K. A. (2015). Moving forward in the debate on causal indicators: Rejoinder to comments. *Measurement: Interdisciplinary Research & Perspectives, 13*(1), 63-74.

Bazan, C., Gaultois, H., Shaikh, A., Gillespie, K., Frederick, S., Amjad, A., ... & Belal, N. (2020). A systematic literature review of the influence of the university's environment and support system on the precursors of social entrepreneurial intention of students. *Journal of Innovation and Entrepreneurship*, *9*(1), 1-28.

Becker, J. M., Klein, K., & Wetzels, M. (2012). Hierarchical latent variable models in PLS-SEM: guidelines for using reflective-formative type models. *Long range planning, 45*(5-6), 359-394.

Benitez, J., Henseler, J., Castillo, A., & Schuberth, F. (2020). How to perform and report an impactful analysis using partial least squares: Guidelines for confirmatory and explanatory IS research. *Information & Management, 57*(2), 103-168.

Beran, R., & Srivastava, M. S. (1985). Bootstrap tests and confidence regions for functions of a covariance matrix. *Annals of Statistics, 13*(1), 95-115.

Bollen, K. A. (1989). A new incremental fit index for general structural equation models. *Sociological methods & research, 17*(3), 303-316.

Bollen, K. A. (2011). Evaluating effect, composite, and causal indicators in structural equation models. *Mis Quarterly*, 359-372.

Bollen, K., & Lennox, R. (1991). Conventional wisdom on measurement: A structural equation perspective. *Psychological bulletin 110*(2): 305.

Bollen, K. A., & Bauldry, S. (2011). Three Cs in measurement models: causal indicators, composite indicators, and covariates. *Psychological methods, 16*(3), 265.

Blanchard, C. (2008). Understanding exercise behaviour during home-based cardiac rehabilitation: a theory of planned behaviour perspective. *Canadian journal of physiology and pharmacology, 86*(1-2), 8-15.

Coccari, R. L., & Javalgi, R. G. (1995). Analysis of students' needs in selecting a college or university in a changing environment. *Journal of Marketing for Higher Education, 6*(2), 27-40.

Cohen, J. (1988). Statistical power analysis for the behavioral sciences (2nd ed.). Hillsdale, NJ: Erlbaum.

Deloitte (2020). *The Thailand Digital Transformation Survey Report 2020*. https://www2.deloitte.com/content/dam/Deloitte/th/Documents/technology/th-tech-the-thailand-digital-transformation-report.pdf

Dijkstra, T. K., & Henseler, J. (2015). Consistent partial least squares path modeling. *MIS quarterly, 39*(2), 297-316.

Fletcher, J. M. (2012). Similarity in peer college preferences: New evidence from Texas. *Social science research 41*(2): 321-330.

Fichten, C. S., Nguyen, M. N., Amsel, R., Jorgensen, S., Budd, J., Jorgensen, M., ... & Barile, M. (2014). How well does the theory of planned behavior predict graduation among college and university students with disabilities? *Social Psychology of Education, 17*(4), 657-685.

Fornell, C., & Larcker, D. F. (1981). Structural equation models with unobservable variables and measurement error: Algebra and statistics. *Journal of Marketing Research, 18*(3), 382-388.

Guerin, R. J., & Toland, M. D. (2020). An application of a modified theory of planned behavior model to investigate adolescents' job safety knowledge, norms, attitude and intention to enact workplace safety and health skills. *Journal of safety research, 72,* 189-198.

Guggenheim, N., Taubman–Ben-Ari, O., & Ben-Artzi, E. (2020). The contribution of driving with friends to young drivers' intention to take risks: An expansion of the theory of planned behavior. *Accident Analysis & Prevention*, *139*, 105489.

Hagger, M. S., Gucciardi, D. F., & Chatzisarantis, N. L. (2017). On nomological validity and auxiliary assumptions: The importance of simultaneously testing effects in social cognitive theories applied to health behavior and some guidelines. *Frontiers in psychology*, *8*, 1933.

Hair Jr, J. F., Hult, G. T. M., Ringle, C., & Sarstedt, M. (2016). *A primer on partial least squares structural equation modeling (PLS-SEM)*. Sage publications.

Henseler, J. (2017). Bridging design and behavioral research with variance-based structural equation modeling. *Journal of advertising, 46*(1), 178-192.

Henseler, J. (2017). ADANCO 2.0. 1: user manual.

Henseler, J., Dijkstra, T. K., Sarstedt, M., Ringle, C. M., Diamantopoulos, A., Straub, D. W., ... & Calantone, R. J. (2014). Common beliefs and reality about PLS: Comments on Rönkkö and Evermann (2013). *Organizational research methods*, *17*(2), 182-209.

Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. *Journal of the academy of marketing science, 43*(1), 115-135.

Henseler, J., Hubona, G., & Ray, P. A. (2016). Using PLS path modeling in new technology research: Updated guidelines. *Industrial management & data systems, 116*(1), 2-20.

Henseler, J., & Schuberth, F. (2020). Confirmatory composite analysis. In *Composite-Based Structural Equation Modeling: Analyzing Latent and Emergent Variables*. Guilford Press.

Hosseini, S. S., Shamsi, M., Khorsandi, M., & Moradzadeh, R. (2021). The effect of educational program based on theory of planned behavior on promoting retinopathy

preventive behaviors in patients with type 2 diabetes: RCT. *BMC Endocrine Disorders, 21*(1), 1-7.

Hoeksma, D. L., Gerritzen, M. A., Lokhorst, A. M., & Poortvliet, P. M. (2017). An extended theory of planned behavior to predict consumers' willingness to buy mobile slaughter unit meat. *Meat science*, *128*, 15-23.

Hu, L. T., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural equation modeling: a multidisciplinary journal, 6*(1), 1-55.

JobHero. (2018, April 28). Visual Effects Artist Job Description. https://www.jobhero.com/job-description/examples/graphic-web-design/visual-effects-artist.

Kim, Y., & Han, H. (2010). Intention to pay conventional-hotel prices at a green hotel–a modification of the theory of planned behavior. *Journal of Sustainable Tourism, 18*(8), 997-1014.

Kusumawati, A., Yanamandram, V. K. & Perera, N. (2010). University Marketing and Consumer Behavior Concerns: The Shifting Preference of University Selection Criteria in Indonesia, Asian Studies Association of Australia 18th Biennial Conference, Adelaide, Australia, 2010

Landis, R. S., Beal, D. J., & Tesluk, P. E. (2000). A comparison of approaches to forming composite measures in structural equation models. *Organizational Research Methods, 3*(2), 186-207.

Lee, N., Cadogan, J. W., & Chamberlain, L. (2013). The MIMIC model and formative variables: problems and solutions. *AMS review, 3*(1), 3-17.

Leone, L., Perugini, M., & Ercolani, A. P. (1999). A comparison of three models of attitude–behavior relationships in the studying behavior domain. *European Journal of Social Psychology, 29*(2-3), 161-189.

Li, S., & Jaharuddin, N. S. (2020). Identifying the key purchase factors for organic food among Chinese consumers. *Frontiers of Business Research in China, 14*(1), 1-23.

Lin, H. F. (2010). Applicability of the extended theory of planned behavior in predicting job seeker intentions to use job-search websites. *International Journal of Selection and Assessment, 18*(1), 64-74.

Lost Boys School of VFX. (2021, March 24). Lost Boys School of Visual Effects: The Studio That Teaches. https://lostboys-studios.com/

Lost Boys School of VFX. (2021, April 28). Advanced VFX Compositing Program: Lost Boys School of Visual Effects. https://lostboys-studios.com/advanced-visual-effects-compositing/.

Lost Boys School of VFX. (2021, May 26). Effects Technical Director Program: Lost Boys School of Visual Effects. https://lostboys-studios.com/effects-technical-director-fx-td/

Maichum, P., & Peng (2016). Application of the extended theory of planned behavior model to investigate purchase intention of green products among Thai consumers. *Sustainability*, *8*(10), 1077.

Mancha, R. M., & Yoder, C. Y. (2015). Cultural antecedents of green behavioral intent: An environmental theory of planned behavior. *Journal of Environmental Psychology*, *43*, 145-154.

Massiera, P., Trinchera, L., & Russolillo, G. (2018). Evaluating the presence of marketing capabilities: A multidimensional, hierarchical index. *Recherche et Applications en Marketing (English Edition)*, *33*(1): 30-52.

Müller, T., Schuberth, F., & Henseler, J. (2018). PLS path modeling–a confirmatory approach to study tourism technology and tourist behavior. *Journal of Hospitality and Tourism Technology,* 9(3), 249-266.

Pimpa, N. (2004). The relationship between Thai students' choices of international education and their families. *International Education Journal, 5*(3), 352-359.

Pimpa, N., & Suwannapirom, S. (2008). Thai students' choices of vocational education: marketing factors and reference groups. *Educational Research for Policy and Practice, 7*(2), 99-107.

Prasetyo, Y. T., Castillo, A. M., Salonga, L. J., Sia, J. A., & Seneta, J. A. (2020). Factors affecting perceived effectiveness of COVID-19 prevention measures among Filipinos during enhanced community quarantine in Luzon, Philippines: Integrating Protection Motivation Theory and extended Theory of Planned Behavior. *International journal of infectious diseases*, *99,* 312-323.

Price, I., Matzdorf, F., Smith, L., & Agahi, H. (2003). The impact of facilities on student choice of university. *Facilities*, *21*(10), 212-222.

Rigdon, E. E. (2012). Rethinking partial least squares path modeling: In praise of simple methods. *Long range planning*, *45*(5-6), 341-358.

Rigdon, E. E. (2016). Choosing PLS path modeling as analytical method in European management research: A realist perspective. *European Management Journal*, *34*(6), 598-605.

Ringle, C. M., Sarstedt, M., & Straub, D. W. (2012). Editor's comments: a critical look at the use of PLS-SEM in" MIS Quarterly". *MIS quarterly*, iii-xiv.

Rönkkö, M., McIntosh, C. N., Antonakis, J., & Edwards, J. R. (2016). Partial least squares path modeling: Time for some serious second thoughts. *Journal of Operations Management*, *47,* 9-27.

Schuberth, F. (2020). Confirmatory composite analysis using partial least squares: Setting the record straight. *Review of Managerial Science*, 1-35.

Schuberth, F., Rademaker, M. E., & Henseler, J. (2020). Estimating and assessing second-order constructs using PLS-PM: the case of composites of composites. *Industrial Management & Data Systems,* 120(12), 2211-2241, doi:10.1108/IMDS-12-2019-0642.

Shalender, K., & Yadav, R. K. (2018). Promoting e-mobility in India: challenges, framework, and future roadmap. *Environment, development and sustainability*, *20*(6), 2587-2607.

Shalender, K., & Sharma, N. (2021). Using extended theory of planned behaviour (TPB) to predict adoption intention of electric vehicles in India. *Environment, Development and Sustainability*, *23*(1), 665-681.

Shanka, T., Quintal, V., & Taylor, R. (2006). Factors influencing international students' choice of an education destination–A correspondence analysis. *Journal of Marketing for Higher Education*, *15*(2), 31-46.

Skoglund, E., Fernandez, J., Sherer, J. T., Coyle, E. A., Garey, K. W., Fleming, M. L., & Sofjan, A. K. (2020). Using the Theory of Planned Behavior to Evaluate Factors That Influence PharmD Students' Intention to Attend Lectures. *American journal of pharmaceutical education*, *84*(5).

Soper, D.S. (2021). A-priori sample size calculator for structural equation models [Software]. Available from https://www.danielsoper.com/statcalc

Soria-Barreto, K., Honores-Marin, G., Gutiérrez-Zepeda, P., & Gutiérrez-Rodríguez, J. (2017). Prior exposure and educational environment towards entrepreneurial intention. *Journal of technology management & innovation, 12*(2), 45-58.

Taylor, S., & Todd, P. (1995). Decomposition and crossover effects in the theory of planned behavior: A study of consumer adoption intentions. *International journal of research in marketing, 12*(2), 137-155.

Tenenhaus, M. (2008). Component-based structural equation modelling. *Total quality management, 19*(7-8), 871-886.

The Rookies. (2020, December 7). Best visual effects schools in the world 2020. https://discover.therookies.co/schools/best-visual-effects-schools-in-the-world/

Think Tank Training Centre. (2021, March 24). Think Tank Training Centre, Visual Effects, Games and Animation School. https://www.tttc.ca/.

Tommasetti, A., Singer, P., Troisi, O., & Maione, G. (2018). Extended theory of planned behavior (ETPB): investigating customers' perception of restaurants' sustainability by testing a structural equation model. *Sustainability, 10*(7), 2580.

Tsen, C. H., Phang, G., Hasan, H., & Buncha, M. R. (2006). Going green: A study of consumers' willingness to pay for green products in Kota Kinabalu. *International Journal of Business and Society*, *7*(2), 40-54.

Wang, S., Fan, J., Zhao, D., Yang, S., & Fu, Y. (2016). Predicting consumers' intention to adopt hybrid electric vehicles: using an extended version of the theory of planned behavior model. *Transportation*, *43*(1), 123-143.

Wathanakom, N., Khlaisang, J., & Songkram, N. (2020). The study of the causal relationship between innovativeness and entrepreneurial intention among undergraduate students. *Journal of Innovation and Entrepreneurship, 9*(1), 1-13.

Wiriyapinit, M. (2007). Is Thai culture the right culture for knowledge management. *An exploratory case study research. Chulalongkorn Review*, *74,* 80-90.

Yadav, R., & Pathak, G. S. (2017). Determinants of consumers' green purchase behavior in a developing nation: Applying and extending the theory of planned behavior. *Ecological economics*, *134,*114-122.

Yannix. (2021). VFX compositors. http://jobs.yannix.com/job-positions/vfx.

Appendix

Planned Behavioral Theory of Education Requirements for Animation and Visual Effects Courses

Items	Detail
Theory Plan Behavior	
Attitudes towards Animation and Visual Effects Work and Career	
ATT1	You are interested in creating animation and visual effects for movies or advertising.
ATT2	You want to work as an animation artist in film or advertising.
ATT3	You want to work as a Visual Effects artist in film or advertising
Perceived Behavioral Control of the need to study animation and visual effects.	
PBC1	I can pay my tuition fees on time.
PBC2	I am ready to learn professional skills in the courses I am interested in.
PBC3	I am confident that I will graduate on time.
Subjective Norm of Decision to Study Animation and Visual Effects	
SN1	Parents allow you to study in this field
SN2	Friends and teachers have encouraged me to study in this field.
SN3	Thai individuals involved in co-producing animation and visual effects for Hollywood films are inspired to study in this field.
Intention to Study Animation & Visual Effect Program)	
INT1	I intend to study in the 3D animation course offered by this institute.
INT2	I intend to study in the compositing course offered by this institute.
INT3	I intend to study in the dynamic simulation course offered by this institute.

Study needs Professional courses in animation and visual effects

Items	Detail
3D Animation course	
ANI1	Professional skills learned character design, puppet modeling, texture creation for the character's skin, and rigging for animation movement.
ANI2	Main computer program (Maya), (3DS Max), (Photoshop) (ZBRUSH)
ANI3	A co-produced course with well-known Thai production studios and faculty graduated from institutions in India and South Korea
ANI4	Study period 12 months
ANI5	Internship period and portfolio creation for another 2 months
ANI6	Graduates receive a salary of about 20,000 baht.
ANI7	The tuition fee is about 100,000 baht (3 times payment).
Compositing course	
COM1	Professional skills learned These include compositing, digital painting (specifically matte painting), simulating camera movement (match move), and animation through rotoscoping.
COM2	Main computer program (Maya), (Nuke), (Photoshop), (Silouette fx), (3DEqualizer),
COM3	A co-produced course with well-known Thai production studios and faculty graduated from institutions in India and South Korea
COM4	Study period 12 months
COM5	Internship period and portfolio creation for another 2 months
COM6	Graduates receive a salary of about 20,000 baht.
COM7	The tuition fee is about 100,000 baht (3 times payment).
Dynamic Simulation course	
DS1	Professional skills learned Use Houdini to create visual effects such as dust, smoke, fire, water, gas, explosions, as well as natural and building collapses, etc.
DS2	Main computer program (Maya), (Nuke), (Photoshop), (Houdini),

Items	Detail
DS3	A co-produced course with well-known Thai production studios and faculty graduated from institutions in India and South Korea
DS4	Study period 12 months
DS5	Internship period and portfolio creation for another 2 months
DS6	Graduates receive a salary of about 20,000 baht.
DS7	The tuition fee is about 100,000 baht (3 times payment).