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Abstract

This study recognized the importance and necessity of incorporating ICT in curriculum design and development in Singapore's private education context. A critical literature review was conducted to investigate the impacts of the ICT implementations at the institute, teacher teaching, and student learning levels with considerations in various curriculum design and development models on the ICT initiative based on a selected private institute. Factors related to the institute, teachers, and students were derived and examined. It was established that the ICT initiative must be founded on the respective curriculum design and development models. Consequently, a conceptual framework was established and confirmed the models' mediating roles between the ICT implementation drive at the institute, teacher, and student levels, and the ICT initiative.

Introduction

An educational institute could harness the competitive advantages derived through the use of Information and Communications Technology (ICT) in educational practices as compared to the traditional face-to-face mode of delivery (Duran-Hernandez, Cornejo-Macias & Flores-Mora, 2017). Furthermore, the implementation of ICT (in different platforms i.e. in and outside the classroom setting) could influence the relationship between teacher teaching and student learning which in turn promotes self-learning and motivates students in attaining optimal academic performance (Ishaq et al., 2020). One of the primary educational goals in the selected institution in this study was to produce business-oriented and business-ready students who should be equipped with certain market-needed competencies (through education) necessary for their future careers. With the advancement in technology, the selected institute has tried to incorporate, change and develop its curriculum using various ICT tools to enhance students' learning experience, improve academic achievements, facilitate exchanges of opinions, generate interest in learning, and promote individual and collective learning. Consequently, it was also crucial to determine the effects of curriculum development and design on ICT implementation which may have an impact on the institute's ICT initiatives.

There is no universally agreed definition of ICT due to its continuously evolving nature. However, most users can agree with its critical advantage that it can unify and integrate various modes of communications such as telephone lines, wireless signals, computers, software, storage, and audio-visual systems, to fully utilize the available

information electronically in a digital form via personal computers, digital television, e-mail (Connell et al., 2015). There are varieties of ICT tools used by many teaching faculties ranging from the basic use of presentation software (e.g. PowerPoint, PowToon, Prezi), and e-mail communication to Learning Management Systems (LMS e.g. Moodle, Blackboard, Edmodo), social media (e.g. Facebook, Twitter, Instagram), and web-based applications (e.g., Google Drive, Dropbox, BaseCamp). Students could interact with their teaching faculties, and access the learning resource via computer and portable devices such as tablets or Smartphone apps. In sum, given the necessity and advantages of ICT, teaching faculty or curriculum developer must consider and realize the impact of respective ICT tools while formulating the curriculum development and design as they have empowered both educators and learners, and will continue to transform the processes of teaching, research, and learning (Das, 2019). The selected private institute (as in most institutions) consists of students from very diverse backgrounds in terms of nationality, English proficiency, computer skills, and prior educational achievements and exposures. As a result, their abilities to adapt and excel in the ICT-embedded curriculum in respective modules vary accordingly. The call for a greater emphasis on an ICT-driven curriculum was required and supported by the various stakeholders such as the external university partners, the local educational agency Committee for Private Education (CPE), the institute itself, the lecturers, and the learners.

As the external overseas degree-awarding university partners should ascertain and safeguard academic quality for the programs offered in the private institute, most of the teaching materials and resources will be provided by the universities via a virtual portal. Both educators and students are given access to the prescribed LMS (Virtual Learning Environment) to download learning materials, submit an assignment, interact with the students from the overseas campus, and seek clarifications concerning academic and non-academic matters via Skype/ZOOM calls or teleconferencing. Additionally, to promote and ensure quality teaching was delivered to the students, the local educational authority CPE (2022) encourages all Private Education Institutes (PEIs) to increase the use of blended learning as one of the EduTrust audit criteria (all PEIs delivering external degree programs must be EduTrust certified) which is even more critical during the COVID-19 period. The selected institute has placed greater emphasis on embedding ICT into its curriculum to fulfill the audit requirements and enhance its branding and market image. As for their lecturers and students, most of them have accepted the ICT-based curriculum to meet the university's requirements, and for their future career preparations. Nevertheless, not all the lecturers and students would embrace the change due to various reasons such as fear of the unknown, established studying or teaching habits or routines, and their resistance could influence the education quality. Therefore, to achieve effective ICT initiatives through its implementations at the institution, student, and teacher level, appropriate curriculum design and development must be selected and employed. Subsequently, this paper will aim to find out whether there is a statistically significant relationship between ICT implementation and ICT initiative in the selected institute, and will this relationship be mediated by the curriculum design and development efforts?

Considerations of ICT Curricular Initiative

Product and Process Models

Before embarking on any curriculum design and development, educators could first identify the main theories that their institutes adopt or believe will guide the curriculum formulation and the student's learning process. There

are fundamentally two ways of exploring curriculum development, namely whether it is regarded as a 'product', or a 'process'. According to Neary (2003) and O'Neil (2010), the 'Product Model' focuses on the plans, intentions, or outcomes whereas the 'Process Model' emphasizes the methods, means, activities, or effects. Tyler (1949), Taba (1962), and Wheeler (1967) were representatives of the 'Product Model' where they mainly focused on the stated learning objectives, employed a sequence of steps, and the curriculum developed and communicated would be controlled by these transparent aims. Alternatively, the 'Process Model' moved the emphasis away from the prescriptive learning objectives. Instead, the educators interact and shift the attention from teaching to learning. In sum, this model focused on 'the means' rather than 'the end' (Walker, 1972; Stenhouse, 1975).

Objective and Interactive Models

In addition to the 'Process' and 'Product' models, Print (1989) and Brady (1990) have classified them as the Rational Objective model (e.g. Tyler and Taba model), Cyclical model (e.g. Wheeler model), and Interactive model (e.g. Walker model). Tyler (1949) believed that educators while designing their curriculum, need to follow the fixed orders of curriculum elements i.e. from defined objectives to contents, method, and evaluation. This model has provided the developer with a vivid direction and a step-by-step guide for the subsequent process (Print, 1989). Still, some of the obvious weaknesses of the Rational Objective model include restricting students' learning, failure to consider the changing external environment, and the unpredictable nature of teaching and learning (Brady, 1995). Conversely, instead of having a static and fixed procedure, the Interactive model, supported by Walker (1971), claimed that the curriculum development process should be dynamic and interactive. Curriculum developers should not rigidly follow the prescriptive and rational sequence of curriculum elements but go through three phases/stages i.e. platform phase, the deliberation phase, and the design phase. In this manner, the decisions made on the curriculum design will be based on the deliberated outcomes of the various beliefs, theories, concepts, opinions, aims, and objectives. Walker (1971) believed this is a more realistic, creative, and flexible way of handling curriculum development as the Objective model is too theoretical and obsessed with writing objectives. Still, this model can identify potential pitfalls in curriculum design, and it has involved and engaged various stakeholders in the deliberation process. Nonetheless, according to Vreuls et al., (2022), the Interactive model can be time-consuming as reaching an agreement from all stakeholders is difficult. Also, this model can be confusing without a systematic and clear direction or objective.

Subject-Centered and Learner-Centered Models

Curriculum designs, according to Tanner (1980), can be further classified as subject-centered or learner-centered. The former concentrates on the content of the curriculum, whereas the latter focuses on the meaningful aspects of the curriculum that is relevant to the learners. In a subject-centered classroom, the teachers, as the source of knowledge, will be in control of the whole learning process. The knowledge and instruction will be delivered in a top-down manner with prescribed existing materials. This design may work well in a PEI with high faculty turnover as the new teachers could resume their roles quickly as the teaching resources are readily available. Moreover, Silvestri (1997) claimed that it is easier for students under the subject-centered model to remember information and knowledge during the lesson for future use, and due to its disciplined design, teachers could better

manage and control their class. Nevertheless, with this top-down control curriculum, a student could be passive in the learning process and may only believe in their textbooks and be afraid to ask questions beyond the boundary. Consequently, they may lack essential skills needed in the 21st Century workplace such as critical and creative thinking skills, life management skills, and interpersonal skills (Scheidies, 2018).

On the contrary, the Learner-centered design places the learners at the heart of the learning process while considering the suitable contents, activities, resources, and pace of learning. The focus will be on the needs of learners instead of the educator or the institution. Accordingly, students will be more active in interacting with their teachers and classmates to seek and construct knowledge that they perceived as useful (Collins & O'Brien, 2003). Consequently, this design will also train them to be competent problem-solvers, critical thinkers, managers, and communicators (Jones, 2007). Nevertheless, Learner-centered teaching has some shortcomings such as the longer lesson preparation time, understanding of students' individual needs and interests, challenging class management (mixed ability), noisy classroom, time management, and increase in teachers' workload. In sum, both subject-centered and learner-centered curriculums are not mutually exclusive, and they will impact the students, teachers, and institutions at different levels. Hence, an educator (functions as curriculum developer) could combine them and constitute a continuum where they could incorporate top-down lectures, and at the same time encourage students to interact more actively with their opinions and ideas, as in problem-based workshops and seminars.

Curriculum Implementations and Limitations

Different Functions of ICT in the Selected Institute Context

ICT, as a tool in education, has different functions. Firstly, it can be used as a tool in setting, researching, communicating, and assessing assignment work. In the selected private institution, most of the coursework, assignments, and oral presentation were conducted and submitted electronically. The institute has minimized the use of printed paperwork. Secondly, ICT can be used as a medium for teaching and learning. Instead of traditional hand-out and lecture notes, the institution has made use of appropriate ICT tools to create interest and promote maximum knowledge and information retention. Depending on the nature of the subject, lecturers will use different tools such as an LMS to share learning resources and conduct evaluation, web learning (e.g. online case study or video case), online training (e.g. Accounting apps), eLearning, and virtual learning. Lastly, ICT can be used to manage academic administration and record management such as student contract generation, school fee collection, timetable scheduling, student attendance, a school examination, result compilation, and academic transcript printing.

ICT Practices in the Selected Institute

Most of the lecturers have sufficient ICT educational skills and the selected institute has tried to provide essential equipment too. The overseas university partner has listed the academic requirements which must be adhered to, lest the selected institute may risk breaching the contract agreement. For example, all learning resources must be uploaded in the virtual learning environment (e.g. Moodle and Blackboard), all research work must be conducted

and submitted via the same LMS, and students are required to participate in the virtual debate assessment with the students at the main campus, and all teaching faculty must be present for the end-semester module results and review meeting virtually. Although teaching faculty frequently consult each other on the curriculum design for their teaching module, they have the liberty to decide which educational practice to use in their lessons, and they will be held responsible for the learning outcomes. However, the selected institute has adopted a more objective, product-based, and subject-centered curriculum practice; hence, the teaching method will be dictated by the learning objective set by the management or the partner university. This will hinder and limit the lecturer's creativity and possibilities.

In sum, the intended curriculum as stated in the selected institute's core value i.e. being student-oriented differed from the enacted curriculum as the lessons delivered were, in practice, not student-centered (Billett, 2006). Because of the constraint to generating maximum passing rate, teaching faculties do not have the power and lacked the motivation to create a stimulating and influential learning environment to guide their students in their learning processes individually. Hence, students' experiences in the lessons will be different. In sum, the strengths of ICT were not fully utilized in the selected institute.

Tyler Model in the Selected Institute

The selected institute is currently using the ADDIE model (Analysis, Design, Development, Implementation, and Evaluation) (Grafinger, 1988; Hannum, 2005) as the guiding factor in its curriculum design, and lesson preparations. This is a combination of Tyler and Walker models where the institute will set a stream of learning objectives and teaching faculties are expected to engage their students and explain what is expected of them in the lesson. Students will be encouraged to explore their learning via various mediums (mostly electronically e.g. video cases, lecture notes, and online quizzes), and they will elaborate their answers to the assignment tasks either through an online platform or using media presentation. Their performance will be evaluated and feedback will be provided via the LMS. Yet, in practice, a more Tyler's goal attainment model is adopted with clearly defined objectives of the learning experience obtained from the student, the society, and the subject content (Keating, 2006), with which the institute has chosen to put greater emphasis on the input of students.

Although Tyler stated the most important part of the curriculum was for learners to acquire learning content that is beneficial and significant to them (Meek, 1993), the selected institute's perception of a student-centered approach differed from the researcher. Due to the diverse and differentiated academic, language, and computer skills backgrounds, some learners find it challenging to adapt to the ICT-based requirements as compared to the traditional curriculum model in their home country. In this aspect, the selected institute has focused on 'helping' the student to pass their studies as the pre-defined objectives and goals. Therefore, the objectives based on the society and the subject content were regarded as 'less important'. Though the applied Tyler's model is product-focused, in this case, there is a deviation between the intended, enacted, and experienced curriculum adopted (Billett, 2006).

Kerr (1968) defined curriculum as where an institute planned and provided guidance to their students (individually

or in groups; on or off campus) on all their learning. Accordingly, the selected institute used an LMS i.e. Edmodo to manage their student's learning. All students are required to sign up for an Edmodo (Moodle equivalent) account where they will have access to all the learning materials, classwork, homework, and evaluation quiz. Both lecturers and learners could interact with each other electronically to check for understanding and clarify any academic doubts. As planned, students will not be restricted by geographical location even when they returned to their home country their communications with the teaching faculties remain intact. With reference to the Tyler model, the learning objective set by the selected institute was attained. Nonetheless, is this the learning experience the students wanted? According to the end-module survey feedback, some students shared that ICT should not and would not replace human interaction. They preferred face-to-face interactions. Ironically, their daily attendance was low except during assignment submission week or the period before the in-class examination. Additionally, the participation rate in the online quiz and exercises was rather low. This may imply that one of the student's academic objectives is only to pass the assessment which is in line with the college's curriculum aim, but certainly not conferring to the expectation of the module contents and society. That is the constant dilemma and tension the teaching faculties have to go through and resolve.

Communicative Approach: Decker Walker Naturalistic Model in the Selected Institute

Conversely, differing from Tyler Model, the modern curriculums or communicative approach according to Walker (2003) or Dewey (2007) is more life-centered focusing on individual development to adapt and manage the social environment as compared to Tyler's descriptive model. Walker used the term 'naturalistic' to show the development of a curriculum should start with the involvement and participation of various stakeholders rather than based on an institutionally defined objective (Brady & Kennedy, 2013). Nonetheless, Walker's three-step sequence of the platform to deliberation to design can still be applied in the selected institute. In most PEIs, apart from offering external degree partner qualifications (where curriculum design is largely dictated and controlled by the degree-awarding partner), they do provide in-house developed language and diploma programs. Some of the programs will be articulated to the external degree programs, as such Tyler Model may meet the learner's needs. The selected institute does design standalone courses according to market and individual learning requirements, as such a naturalistic approach to curriculum development may be more effective. Furthermore, in this intensely competitive and saturated market, understanding and meeting the student's learning objective will attain a competitive advantage over those who failed to customize their curriculum design accordingly. Although time-consuming, the consensus derived (or at times lacked unanimous agreement) through the participation of various people in the curriculum planning and development process may prove to be worthwhile and beneficial in the long run (Marsh, 2004). In this context, institutes can involve the five bodies of experiences (Schwab, 1973) to collaborate, deliberate, and finalize the design of the market-wanted or learner-centered course. Nonetheless, to formulate an effective curriculum, the institute must ensure that the invited 'five bodies of experiences', namely subject experts, learners, the milieu, teachers and curriculum specialists are qualified individuals to meaningfully contribute, debate, confront, and agree with the desired curriculum design, and pinpoint the potential pitfalls (Taylor & Richards, 2018). In sum, the Naturalistic Model is not theoretical (as there is one single theory that can be used to unite students' learning needs) but involved principled reasoning to bridge the gap between theory and practice.

Positive and Negative Impacts of ICT in Education

There are numerous advantages of ICT in education such as it promoting borderless access to education, reducing education costs, improving the quality and effectiveness of tertiary education and learning, and increasing employment opportunities. All these benefits are certainly part of the curriculum objectives in a profit-driven PEI. Conversely, as far as the ‘unwanted or undesirable’ hidden curriculum caused by ICT (Tiilikainen, 2018) in education is concerned, learners may have access to morally inappropriate, harmful, or abusive material. Overly dependent and reliance on ICT may cause students’ basic mental arithmetic skills and literacy skills to deteriorate. Lastly, instead of encouraging learners to conduct critical research and deepen their understanding of the subject contents, some students ended up copying and pasting too much information from the electronic resources which could lead to potential academic misconduct such as plagiarism or collusion. To curb this, both educators and learners should attend relevant training programs on the ethical use of technology. The lecturers must model themselves to lead their students on these enriching learning adventures with the help of technology (Heek and Myung, 2010).

Proposed Conceptual Framework

Overall, this study focused on the various factors that will influence the implementation of the ICT initiative. The critical literature review has recognized several factors from the different levels i.e., the selected private institute, its teachers, and students. It has also confirmed the effect of various curriculum design and development models on the ICT initiative. Hence, further investigation will be conducted to examine the mediating roles of curriculum design and development models between the ICT implementation at the institute, student, and teachers’ levels, and the institute’s ICT initiative. This conceptual framework is presented diagrammatically in Figure 1.

Based on the conceptual framework, the following hypothetical interaction and a hypothesis were derived for further investigation. The respective null hypotheses were as follows:

- H₀₁: There is no relationship between ICT implementation Drive and Effective ICT Initiative.
- H₀₁₋₁: There is no relationship between ICT Implementation Drive at Institution Level and Effective ICT Initiative.
- H₀₁₋₂: There is no relationship between ICT Implementation Drive at Student Level and Effective ICT Initiative.
- H₀₁₋₃: There is no relationship between ICT Implementation Drive at Teacher Level and Effective ICT Initiative.
- H₀₂: There is no relationship between ICT Implementation Drive and Curriculum Development Model.
- H₀₃: There is no relationship between ICT Implementation Drive and Curriculum Design Model.
- H₀₄: Curriculum Development Model does not play a mediating role between ICT Implementation Drive and Effective ICT Initiative.
- H₀₅: Curriculum Design Model does not play a mediating role between ICT Implementation Drive and Effective ICT Initiative.

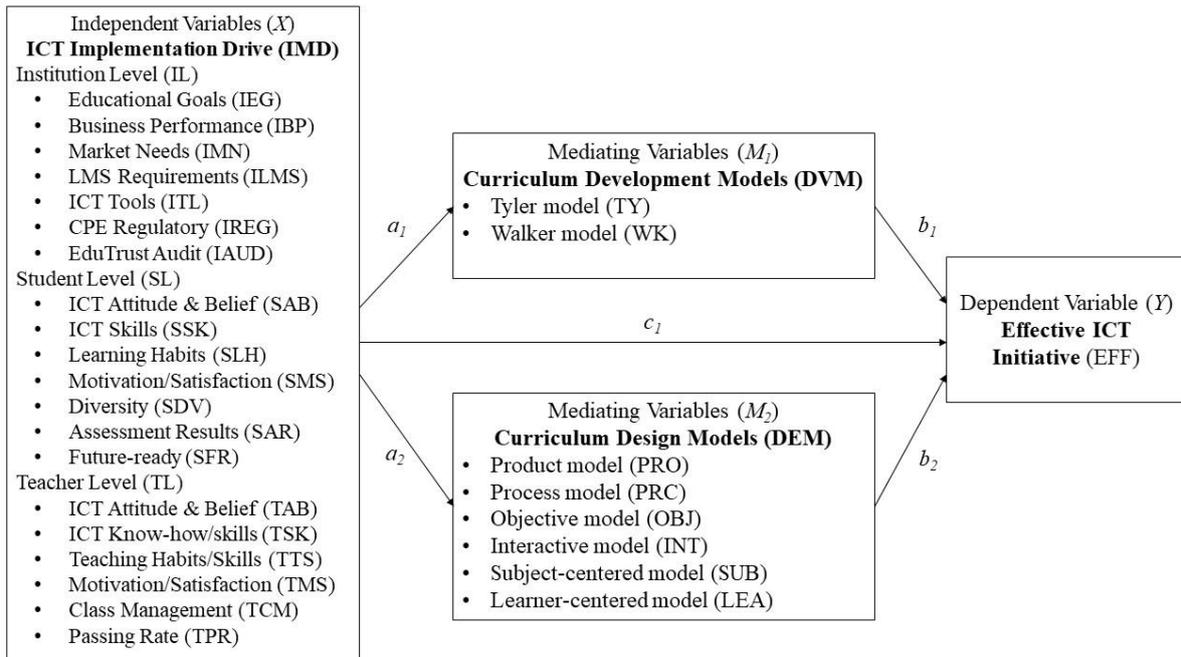


Figure 1. Proposed Conceptual Framework

Method

This paper utilized a standardized survey questionnaire which in turn was used to test and quantify defined hypotheses through the collected data and statistical analysis. To promote reliability, the instrument would be well-designed to ensure conciseness and simplicity to promote a high level of interest by the respondents who would provide the most complete, accurate, and unbiased information. The constructs of the independent variable i.e. ICT Implementation drive (at Institution, Student, and Teacher level), mediating variables i.e. Curriculum Development Models (Tyler and Walker model) and Curriculum Design Models (Product and Process, Objective and Interactive, and Subject-centered and Learner-centered), and dependent variable i.e. Effective ICT Initiative was used to design and frame the questionnaire survey. Subsequently, the various stakeholders of the selected institute (management, operation, and administrative staff, academic staff, and students (full-time and part-time) were invited to participate and contribute their personal opinions through the five-point Likert scale with choices ranging from 'Fully Agreed' (5) to 'Completely Disagree' (1). As this survey aimed to gather data opinions on the institute's ICT initiatives, it did not require specific demographic profiles such as gender, age, or nationality. Data collection was completed in 2021 via an online survey form and generated 392 responses with no missing data due to the mandatory condition set for each question. Subsequently, reliability analysis, hypothesis testing, correlational analysis, and Sobel test were performed to analyze the collected data and investigate the hypotheses and mediating effects of the curriculum development model and curriculum design model.

Results and Discussion

Reliability Analysis

Before succeeding in data analysis, the internal consistency tests on the research structure were performed to

measure the actual value of the reliability of the system. The Cronbach's alpha calculation and complex reliability on internal consistency tests for ICT Implementation Drive (IMD) (both collectively and at Institution Level (IL), Student Level (SL), and Teacher Level (TL), Curriculum Development Models (DVM), and Curriculum Design Models (DEM) were measured and tabulated as shown in Table 1.

Table 1. Reliability Analysis

Constructs	Cronbach' alpha	No of items
Institution Level (IL)	0.787	7
Student Level (SL)	0.774	7
Teacher Level (TL)	0.669	6
ICT Implementation Drive (IMD)	0.884	20
Curriculum Development Models (DVM)	0.805	2
Curriculum Design Models (DEM)	0.867	6

According to Yona (2020), the rule of thumb for Cronbach alpha must not be lower than 0.5 as there may be a presence of unreliable variables that will affect the results of the projected outcome. Furthermore, the strength of association will be considered 'Moderate' for values ranging from 0.6 to 0.7, 'Strong for values between 0.7 and 0.8, and 'Very Strong from 0.8 to 0.9. Since the coefficient results for this study ranged from 0.669 to 0.867, the outcomes were acceptable; hence, factor reduction analysis for the removal of questionnaires used for this study was unnecessary.

Correlational Analysis

Before Sobel Test, correlational analyses were performed (see Table 2) for the independent variable and Mediating variables, Mediating variables and Dependent variable, and independent variable Dependent variable. This was used to evaluate and ensure the linearity of their relationships.

Table 2. Pearson Correlational Analysis

				IMD			DEM						DVM	
Independent Variable:	IMD	DVM	DEM	IL	SL	TL	PRO	PRC	OBJ	INT	SUB	LEA	TY	WK
Dependent Variable: EFF	0.91	0.50	0.86	0.70	0.81	0.82	0.79	0.72	0.68	0.61	0.65	0.78	0.70	0.74

Correlation is significant at the 0.01 level (2-tailed),

The correlation coefficients for the respective paths and the links between the variables were statistically significant. It was observed that mediator DVM displayed comparatively weak associations to both independent variable IMD and dependent variable EFF which may signify that there are other important determinants or variables to be considered. This could be verified when the coefficient of determination was conducted which returned values of 17% for DVM and IMD, and 25% for DVM and EFF. Additionally, the value derived between

IMD and EFF was strongly positively correlated, $r(392)=0.91, p<0.01$ which could affect the mediating effects of DVM and DEM. In sum, at the bivariate level, these results showed that the conditions necessary to conduct the Sobel test to determine the mediating effects have been met as all the required relationships were found significantly correlated.

The correlation analysis was also computed among 6 factors of the mediating variable i.e., DEM and 2 factors of DVM on data for 392 participants to examine their relationships with the dependent variable EFF. The results showed that all correlations were statistically significant and obtained correlation coefficient values ranging from 0.61 to 0.79 between DEM and EFF, and 0.70 to 0.74 between DVM and EFF. The results suggested that the Product model (PRO) and Learner-centered model (LEA) displayed a moderately positively correlated $r(392)=0.79, p<0.01$, and $r(392)=0.78, p<0.01$, which could contribute to the successful implementation of effective ICT initiatives (EFF). Similarly, the Walker model (WK) attained a moderately positive correlation value $r(392)=0.74, p<0.01$, which could signify the participants perceived the communicative approach in curriculum development could have a greater impact on the effectiveness of the ICT initiative as compared to the objective approach based on the Tyler model (TY).

Hypothesis Testing

A one-way ANOVA was performed to compare the effect of three different levels i.e., at IL, SL, TL of ICT implementation drive (IMD) on EFF, and the results were summarized in Table 3.

Table 3. Hypothesis Testing of IL, SL, and TL on EFF

Independent Variable	Dependent Variable	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
Constant		0.386	0.073		5.301		0.243	0.529
IL	EFF	0.167	0.023	0.190	7.344	0.000	0.122	0.212
SL	EFF	0.377	0.022	0.440	17.097	0.000	0.333	0.420
TL	EFF	0.354	0.021	0.444	16.706	0.000	0.312	0.395

The one-way ANOVA showed that there was a statistically significant difference in the implementation levels: $F(3,388)=731.702, p<0.000$. Tukey's HSD test for multiple comparisons confirmed that there were significantly different between IL and EFF ($p<0.000, 95\% \text{ C.I.}=0.122, 0.212$), SL and EFF ($p<0.000, 95\% \text{ C.I.}=0.333, 0.420$), and TL and EFF ($p<0.000, 95\% \text{ C.I.}=0.312, 0.395$). Consequently, the null hypotheses $H_{01-1}, H_{01-2},$ and H_{01-3} were rejected. Hence, it can be concluded that there is a relationship between ICT Implementation Drive at Institution Level, Student Level, Teacher Level, and Effective ICT Initiative. Additionally, judging from the correlational analysis conducted, all three levels displayed a strong to very strong positive correlation to EFF, in particular for SL: $r(392)=0.81, p<0.01$, and TL: $r(392)=0.82, p<0.01$ which implied that institution could place emphasis student learning and teacher teaching while formulating and implementing their ICT initiative. Based on the correlation analysis between SL and EFF, the focus could be on the strongest correlated factor such as SAR: $r(392)=0.75, p<0.01$ as students, in general, still view academic results as important and would expect the ICT initiative to

boost their academic performance. Similarly, at the TL level, the focus could be on TAB: $r(392)=0.73, p<0.01$ as the teachers' attitude and beliefs in ICT could influence and enhance their lesson deliveries and performance would certainly affect the ICT initiative.

Regression analysis was performed on IMD, DVM, DEM, and EFF, and Table 4 below summarized the respective results which were used to test the hypotheses:

Table 4. Hypothesis Testing of IMD, DVM, and DEM on EFF

Independent Variable	Dependent Variable	Unstandardized Coefficients		Standardized Coefficients	F	Sig.	Sobel Test
		B	Std. Error	Beta			
IMD	DVM	0.760	0.085	0.412	79.664	0.000	5.512 SE=0.011, p<0.000
IMD	EFF	0.906	0.020	0.913	1960.700	0.000	
IMD	EFF	0.847	0.021	0.854	1114.561	0.000	11.389 SE=0.025, p<0.000
DVM		0.077	0.011	0.144			
IMD	DEM	0.924	0.036	0.792	654.419	0.000	11.389 SE=0.025, p<0.000
IMD	EFF	0.906	0.020	0.913	1960.700	0.000	
IMD	EFF	0.624	0.028	0.629	1458.083	0.000	p<0.000
DEM		0.305	0.024	0.359			

There is a positive relationship between ICT Implementation Drive and Effective ICT Initiative with 91% influence of ICT Implementation Drive on Effective ICT Initiative. Additionally, the respective levels (Institution, Student, and Teacher) of ICT Implementation also exhibit 19%, 44%, and 44% respectively on Effective ICT Initiative. Consequently, the respective null hypotheses were rejected when ICT implementation Drive H_{01} (including IL, SL, and TL) have a positive influence on the Effective ICT Initiative. Furthermore, there is a positive relationship between ICT Implementation Drive and Curriculum Development Model and Curriculum Design Model with 41% and 79% respectively. Therefore, the respective null hypotheses H_{02} and H_{03} were rejected when ICT implementation Drive will have a positive influence on Curriculum Development Model and Curriculum Design Model. These hypotheses were the prerequisite before the Sobel Test analysis.

Mediating Effects Analysis

Sobel Test was conducted to determine the mediating effects of the Curriculum Development Model and Curriculum Design Model on the effectiveness of the ICT initiative. The results were summarized in Figure 2.

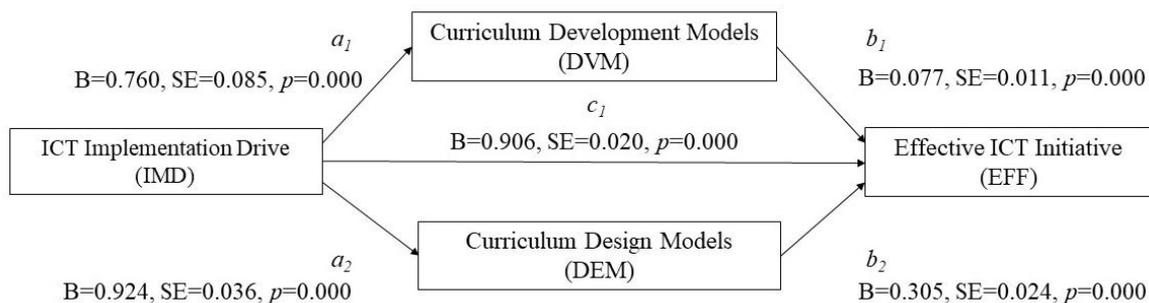


Figure 2. Mediating Effects Analysis with Sobel Test

As shown in the Figure 2, the independent variable is IMD (ICT Implementation Drive), the dependent variable EFF (Effective ICT Initiative), and the mediating variables are Curriculum Development Model and Curriculum Design Model. According to Baron and Kenny's (1986) mediation analysis, for a complete mediation to occur, IMD must significantly predict EFF and DVM/DEM individually, and both DVM/DEM must significantly predict EFF respectively. However, when DVM/DEM enters the IMD and EFF relationship, the total mediating effect will be reduced significantly to non-significant or rendered as partial mediation. Additionally, to achieve a meaningful mediating effect analysis, the indirect effect must be statistically significant, and the Sobel test statistics must be greater than zero or the z-value must be greater than 1.96.

The results showed that in the first stage, IMD significantly predicted DVM ($F=79.664$, $p<0.001$), and IMD significantly predicted EFF ($F=1960.700$, $p<0.01$) in the second stage. In the third stage, IMD was combined with DVM and has significantly predicted EFF ($F=1114.561$, $p<0.01$). However, there was a decrease in the standardized coefficient EFF from 0.913 in the second stage to 0.854 in the third stage. Therefore, after identifying mediating effects in the relationship between DVM and EFF, and identifying the significance of the indirect effects of IMD on EFF through DVM using the Sobel Test ($Z=5.512$, $SE=0.011$, $p<0.001$), the mediating effects were examined, and confirmed. However, when IMD entered the relationship between DVM and EFF, the direct effect ($B = 0.907$, $p < .001$) was significant, and it was concluded that a partial mediation occurred between IMD on EFF via DVM. Furthermore, the presented null hypothesis H_{04} was rejected when Curriculum Development Model does play a mediating role between ICT Implementation Drive and Effective ICT Initiative. Similarly, the results showed that in the first stage, IMD significantly predicted DEM ($F= 654.419$, $p<0.001$), and IMD significantly predicted EFF ($F=1960.700$, $p<0.01$) in the second stage. In the third stage, IMD was combined with DEM and has significantly predicted EFF ($F=1458.083$, $p<0.01$). However, there was a decrease in the standardized coefficient EFF from 0.913 in the second stage to 0.629 in the third stage. Therefore, after identifying mediating effects in the relationship between DEM and EFF, and identifying the significance of the indirect effects of IMD on EFF through DVM using the Sobel Test ($Z=11.389$, $SE=0.025$, $p<0.001$), the mediating effects were examined and confirmed. However, when IMD entered the relationship between DEM and EFF, the direct effect ($B = 0.907$, $p < .001$) was significant, and it was concluded that a partial mediation occurred between IMD on EFF via DEM. Furthermore, the presented null hypothesis H_{05} was rejected when Curriculum Design Model does play a mediating role between ICT Implementation Drive and Effective ICT Initiative.

Conclusion

This study concluded that the implementation of the ICT initiative could be affected by the respective independent variables i.e. the institute, students, and teachers' levels, and mediated by both curriculum design and development models. Eisner (1985) introduced the concept of explicit and implicit curriculum. It was highlighted that how the teachers design and deliver their lessons and the setup of the classroom environment have a direct influence on students' learning. This study explored the explicit ICT curriculum according to the external university and local institutes' defined objectives. Accordingly, the teaching faculty used various technology-based tools to deliver the module contents. Nevertheless, the intended curriculum differed from the enacted and experienced curriculum. One of the contributing factors that caused the deviation could be the leadership of the selected institute depends

on the extent to which they seek adherence to college policies, support from the Board of Directors, meeting the contractual agreement with the university partner, fulfillment of CPE EduTrust requirements, and the availability of essential resources.

In addition, the selected institute also provided an implicit or hidden curriculum delivered through teaching faculties' attitudes and the school environment consciously or unconsciously. The selected institute aims to mold and prepares every student to be a highly competitive businessperson. Through quoting, sharing, and demonstrating their business application know-how, the lecturers communicate the required attitude to their students. Still, this intended hidden curriculum was proven largely unsuccessful as most of the student's academic need was to pass the assessment as gathered and revealed during the mid-term and end-semester module satisfaction survey where students indicated their education goals. That has created a curriculum gap to be bridged as there is a clear discrepancy between what they were taught, and what they expected to learn (Aderonmu et al., 2014). Furthermore, the selected institute has a pragmatic reason when they chose an Objective model as their basis for curriculum development. The ICT curricular initiative was not mainly implemented for the benefit of the students but to fulfill the contractual agreement with the university partner and the educational authority requirement. Conversely, in the long run, a student-centered constructivist approach (opposed to passive learning) where learners could participate in the deliberation process (as in the Walker model), and become the maker of meaning and knowledge would produce more satisfied and competent students which in turn boost the institute competitive branding and market positioning.

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