First author, year **Doi, PMID or URL**	**Framework/Model**	**Target audience**	**Description**	**Variables and Sub-variables**	**Strengths**	**Areas for development**
Ali, 2018 https://doi.org/10.1108/ITP-10-2016-0246	The study objectively aims at exploring the implementations of e-learning architecture and potential hindrance frameworks.	Not specified	In-depth Literature review methodology remains adopted within the research. Reviewed articles were drawn from peer reviewed journals and open sources.	- Technology - Pedagogy - Individual - Enabling Conditions	The TIPEC framework facilitates engagement and performance of e-policymakers, educators and researchers within e-learning initiatives.	It lacks a distinct categorization of e-learning challenges to implementation based on varying education policies in different economies.
Anderson, 2009 https://doi.org/10.1002/j.1681-4835.2009.tb00271.x	Framework on challenges for e-Learning	Not specified	The study performed literature review and identified thirty challenges belonging to four main categories: 1. Challenges pertaining to individuals' characteristics (both students and teachers) 2. Technological challenges 3. Course challenges (different support functions, the course itself with its pedagogy and activities) 4. Contextual challenges (the institutional management and organization as well as the surrounding society with its values and regulations).	- Challenges pertaining to individuals' characteristics - Technological challenges - Course challenges - Contextual challenges	E-learning remains subject to diverse challenges based on the framework structure and course curriculum. However, the challenges are deemed equal for both developed and developing countries.	The framework is static and about challenges encountered.
Arbaugh, 2008 https://doi.org/10.1016/j.iheduc.2008.06.003	The Community of Inquiry Framework	Community in learning (CoI)	Their framework posits that effective online learning is a function of the interaction of three elements: teaching presence, social presence, and cognitive presence.	- Teaching presence - Social presence - Cognitive presence	The COI provides a dynamic model for effective online learning. Research has shown that COI is a potentially powerful theoretical framework for explaining online learning effectiveness.	It does not take external factors such as group size or technical factors into account. While the model helps construct and define an effective teaching model, it does not take in consideration that the effectiveness of

						teaching is equally dependent on the learners and learners' presence.
Arinto, 2013 https://doi.org/10.19173/irrodl.v14i1.1393	The TPACK framework and Framework of Developing ODeL Skills	Combination of technology, pedagogy and content. Faculty's course design practice in content, teaching, learning activities and assessment.	Based on the four areas of change in course design practice identified in the study (i.e., content development, learning activities, teaching strategies, and assessment) and related research, the following framework of ODeL skills is proposed	TPACK: technology, pedagogy and content. Content development. Teaching strategies, learning activities and assessment.	The new framework has strong theoretical basis on the TPACK model	The framework includes three variables only: content, technology and pedagogy. The framework does not include important variables such as structure and outcome.
Asgarimehr, 2012 https://www.ijcsi.org/papers/IJCSI-9-1-1-129-138.pdf	A Strategic Framework for Designing E-Learning System with Focus on University Entrepreneurship	Higher education	A strategic framework for designing e-learning system with focus on university entrepreneurship.	- Rules and Practices of Higher Education - Context - Mission and Goals - Education, Research, Entrepreneurship - Management & Support - Infrastructure - Continuous Evaluation & Improvement - Government and Industry	Comprehensive and validated framework	Does not consider students' needs.
Baran, 2014 https://doi.org/10.1007/s11528-014-0791-0	Professional development framework for online teaching	Not specified	The scope of the proposed framework, successful online teaching is considered to be the result of complex interplay among personal, pedagogical, contextual, and organizational factors within higher education institutions It is "holistic" in the sense that it emphasizes both the importance of the whole and the interconnectedness of its parts.	- Organization - Community - Teaching	The framework demonstrates a clear relationship between three critical areas: teaching, community and organization. It stresses the need to consider all three areas in order to assists faculty members to transition successfully to online education.	The framework puts great emphasis on the professional development of teachers, and the factors that can help faculty members' to successfully transition to online teaching. It does not consider student needs.

Billings, 2001 https://doi.org/10.1097/00012272-200103000-00005	Benchmarking Framework	Web-based Nursing course	Research using framework to establish best practices or a benchmarking framework	**Outcomes** - Access - Convenience - Connectedness - Preparation for real "world" - Proficiency with technology use - Socialization - Satisfaction - Educational practices - Active Learning - Prompt feedback - Time on task - Collaboration and interaction among peers - Student faculty interaction **Use of technology** - Technology infrastructure - Use of technology promotes productive use of time	Includes important variables such as convenience, access and connectedness	Strong focus on benchmarking Best Practices in Web-Based Nursing Courses, but does not include structure, cultural and social aspects and evaluation
Bozkurt, 2013 https://eric.ed.gov/?id=EJ1076072	The Systems Engineering Framework	Combination of course and contents, student's needs and support offered	The systemic view establishes the definition and boundaries of the system, the subsystem, the components, and the constraints that are imposed upon the system; the life cycle starts with the identification of a need, and is followed by the conceptual design, preliminary design, detailed design and development, production and/or construction, and operational use and support phases.	**Systemic view** - Identify course and specifics - Identify resources and constraints **Lifecycle** - Identify student, instructor and industry needs and requirements - Identify course design, development and delivery stages **Support structure** - Identify collaborations and instructor support	Validated and tested using survey. Generalizability – The generalizability of the framework makes it easier to transfer from one course to another or from one discipline to another.	Very facilitator oriented – does not consider student's needs (e.g., tutoring)

				- Tutorials, workshops, seminars other faculty - Maintenance and modification - Budget		
Chandler, 2000 https://pubmed.ncbi.nlm.nih.gov/10688465/	Work effectiveness model	Nursing	Provides framework for empowering faculty and students for success in teaching and technology.	**Technology** - Information - Support - Resources - Critical Relationships **Pedagogy** - Information - Support - Resources - Critical Relationships **Making technology invisible**	Focuses on smoothing the paradigm shift for interactive video in teaching and addresses essentials aspects such as pedagogy, technology and infrastructure	This model focuses on the specific use of interactive video such as technical support. It does not consider aspects such community and sense of belonging to the online community.
Dudding, 2004 https://doi.org/10.1177/1525740104025003 0501	E-Supervision Model	Nursing	University staff and off-site supervisors consult and discuss students' clinical performance using videoconferencing equipment, flexible scheduling	- Equipment - Transmission protocol - Technology support issues/needs.	- Quality of interaction between clinical instructor/ student clinician - Adaptability and accessibility. - Solutions to clinical training challenges	No feedback for student. Equipment costs.
Dumchin, 2009 https://doi.org/10.1016/j.aorn.2009.11.068	Not named	Perioperative nursing	A conceptual framework derived from the combination of Benner's Novice to Expert theory, social constructivism, the principles of adult learning, and advanced technology.	- The student - The factors influencing - The learning - The instructor	Fuses several fundamental concepts (e.g., constructivism, adult learning, Benner's model).	- The model is very student oriented and student centred only put little emphasis on the needs of the facilitators. - Very specific to operating room nurses.

						- No recent or novel additions
Ekmekci, 2013 http://dx.doi.org/10.5539/hes.v3n1p29	Model for an Asynchronous Learning Intervention with Built-in Teaching Presence	Teaching Presence	The four major phases of this model, along with the key questions that define teacher presence in each one of these phases may be summarized as follows	4 phases: - Phase I: Define Measurable Learning Objectives - Phase II: Plan Learning Intervention - Phase III: Design Learning Evaluation - Phase IV: Implement Learning Intervention and Conduct Learning Evaluation	Clear stages/phases for planning e-Learning course with extra attention to teacher presence in asynchronous learning	Very teacher centred. Focuses solely on Establishing Instructor Presence in an Online Learning Environment, but does not focus on increasing student presence
Freeman, 2005 https://pubmed.ncbi.nlm.nih.gov/16315743/	The Systematic Instructional Design Model, promoted by Dick and Cary Modified Systematic Instruction Design mode!	Web-based curriculum model for baccalaureate-level clinical laboratory science (CLS) education	Used to prepare faculty member in developing web-based distance education	1. Identification 2. Instructional Analysis 3. Learner And Context Analysis 4. Definition Of Objectives 5. Assessment Instrument 6. Instructional Strategy 7. Materials Development 8. Formative Evaluation 9. Summative Evaluation Of Instruction	SID training valued their new skills in developing distance education courses and improving their traditional teaching activities.	Further study is warranted on the effect on student learning that could be attributed to the use of SID.
Ghilay, 2014 https://doi.org/10.26634/jet.11.2.2917	TMOC: Training to Management of Online Course.	enable staff members to deal with online teaching, learning and assessment appropriately	The model is designed to train lecturers in higher education to successfully create, deliver and develop online courses.	TMOC is based on the following two fundamental components: 1. Curriculum: specific topics required for management of online courses. 2. Ways of learning: particular ways of learning the curriculum.	Gives a detailed exemplification of the diverse ways in which lecturers can design their own online curriculums to meet various student needs and learning styles.	The model is designed to train lecturers in higher education to successfully create, deliver and develop online courses. Therefore, the focus of the TMOC is on the training of lecturers and does not focus on students' needs.

Goodyear, 2001	CSALT Networked Learning Model	Tutors in higher education	The pedagogical framework defined here introduces four levels of pedagogy: - Philosophy - High-level pedagogy - Strategy and tactics The upper two levels are considered as declarative or conceptual and the lower two levels are regarded as procedural or operational. The model suggests a distinction between the tasks designed by the tutor and the activities carried out by the learner.	- Philosophy - High- level pedagogy - Strategy - Tactics - Organizational context	The model is sensitive to organizational context and has strong focus on collaborative learning. Makes a distinction between the tasks designed by the tutor and the activities carried out by the learner	Aims particularly at tutors in higher education and but does not consider students or institutional needs.
Glancy, 2013		Not specified	The research adopts a theoretical approach to the review of the conceptual e-learning framework for Higher learning.	The conceptual e-learning framework supports the self-directed learning. E-Learning based on this framework has the potential to out-perform not only current learning management systems such as Blackboard. Findings of the research tests indicate a significant rise in the student's online interactivity and engagement.	The study endorses the conceptual e-learning framework serving student-centred learning, which facilitates student engagement and performance within these e-learning courses.	The study performs an extensive review of the conceptual model that provides resourceful insights on student-centred approach within online learning. However, the research methodology limits the practical testing of the conceptualized model.
Granic, 2010 https://doi.org/10.1016/j.compedu.2009.05.018	UNITE (Unified e-Learning environment for the School) pedagogical framework	Secondary schools	Design, implement and validate a pedagogical framework for e- and m-learning in secondary schools	- Pedagogical framework context - Pedagogical approaches, - Assessment techniques, - Current pedagogical practices - Teacher training	Validated pedagogical framework. Includes several pedagogical approaches such as blended learning, Constructivism, Collaborative Learning	Does not consider the social, cultural or ethical issues.
Hadullo, 2018	The study primarily aims at exploring the dynamics e-learning architecture and e-	The study adopts a sample population of 350	The study adopts a quantitative research design, which adopts email survey, telephone survey and	Significant research findings indicate predominant factors influencing the quality of e-	While developing countries actively adopt e-learning	The study establishes the distinct hindrance to the effective

https://doi.org/10.19173/irrodl.v19i1.3322	learning service delivery within higher-level institutions in Kenya.	students participating in School of Distance E-learning (SODEL)	interview for the collection of research data.	learning service at the JKUAT higher learning institution. Major factors include; e-learning course design, content delivery, learner characteristics, course support, administrative support and course assessment.	architectures within their higher education institutions, the study emphasizes on e-learning framework that accounts for e-learning service quality based on primary quality factors.	implementation of e-learning within developing countries. However, the study's limitation manifests in the adopted small sample size.
Haw, 2015 https://doi.org/10.17485/ijst/2015/v8i32/92103	Learn Cube	Not specified/secondary school	The LearnCube is a multi-dimen-sional conceptual framework that considers students, teachers and institutional needs.	- Student Dimension - Teacher Dimension - Course Dimension - Design Dimension - Technology Dimension - Support Dimension	Based on previously developed e-Learning models and theories. Includes aspects such as management support.	Does not consider aspects such as "community" (e.g., collaborative learning environment)
Jefferies, 2005 https://pubmed.ncbi.nlm.nih.gov/16130343/	Hyperlearning Model	Undergraduate students, critical care students	An instructional design model, the Hyperlearning Model, was developed based on Chickering and Gamson's principles of best practices in undergraduate education and to guide the development of an online course for basic critical care content.	- Accommodation of a variety of learners - Enhancement of students' clinical competence - Access to a virtual center of best practices (VCBP) - Access and flexibility for learners - Facilitation of educational mobility	Model has been validated Focuses on the importance of interactive learning by utilizing four dimensions: general principles, process, critical thinking, and professional application. Very student oriented (students' satisfaction).	Does not consider factors such as community, technical support, faculty support.
Johnson, 2003 https://doi.org/10.1002/ace.117	An Instructional Strategy Framework for Online Learning Environments	Online Learning Environments	Powerful online learning environments need to contain a combination of the following principles: 1. Address individual differences 2. Motivate the student 3. Avoid information overload	- Encourage student reflection - Create real life context - Motivate the student - Provide hand-on activities - Avoid information overload	Based on learning theories (e.g., behavioural leaning theory) Strong student focus and includes the importance of social	Model focuses on the needs of student, but does not consider institutional or facilitator need's.

			4. Create a real-life context 5. Encourage social interaction 6. Provide hands-on activities 7. Encourage student reflection	- Encourage social interaction - Address individual differences	interaction in an online learning environment.	
Khan, 2015 https://doi.org/10.1007/BF02778228	Eight-component framework for e-learning	Not specified	The framework has eight dimensions: institutional, pedagogical, technological, interface design, evaluation, management, resource support, and ethical. Each dimension has several sub-dimensions each consisting of issues focused on a specific aspect of an e-learning environment.	- Pedagogical dimension - Technological dimension - Interface design - Evaluation - Management - Resource support - Ethical dimension - Institutional dimension	- Comprehensive framework	Falls short on engaging the students.
Kerr, 2019 https://files.eric.ed.gov/fulltext/EJ1216684.pdf	MOOC Design Mapping Framework (MDMF)	Learner centered overall course design tool	A fully online framework to support MOOC curriculum design that could be collaboratively authored by the MOOC team. The framework takes the form of a visual, online web resource, produced using RealTimeBoard.	- Academic/ content specialists - Learning technologists/academic development - Media unit/production specialists - Platform suppliers - Social media team	- Enhances collaboration between the team - Supports the learning technologist's dialogue with academics - Helps to construct a more learner-centred design	- Does not consider the bigger picture of institutional needs etc. - Technical limitations mentioned by both academics and learning technologists. Firstly, the lack of flexibility with the tool itself
First author, year **Doi, PMID or URL**	**Framework/Model**	**Target audience**	**Description**	**Variables and Sub-variables**	**Strengths**	**Areas for development**
MacDonald, 2001 http://dx.doi.org/10.1016/S1096-7516(01)00045-8	The Demand-Driven Learning Model (DDLM)	Academics	An e-learning model that is grounded within a constructivist framework and defined by five inter-related dimensions that, in concert, create a high-quality e-learning experience superior structure; three consumer demands of content, delivery, and service; and learner outcomes.	Five inter-related dimensions: - Structure - Content - Delivery - Service - Outcomes	- Very clear model for e-learning - Very comprehensible - Grounded not only in learner demands but also recognizes the needs of	- Was developed 18 years ago, educational and digital environment has changed sustainably over the last years

					instructors and designers	- Rather static and not interactive
MacDonald, 2009 https://doi.org/10.1504/IJEH.2009.026271	W(e)Learn framework	Academics	W(e)Learn can be used as a quality standard and a guide to design, develop, deliver and evaluate online IPE in both pre- and post-qualification educational settings. The framework is presented in the spirit that educational programs have defining features that, when carefully designed with the appropriate blend of factors, can help achieve desired outcomes.	- Structure - Content - Media - Service - Outcomes - Emergent Design - Ongoing evaluation - Socioconstructivist Theories - Interprofessionalism	Grounded in socioconstructivist theory	Intended audience was inter-professional healthcare although adaptable to any eLearning design, delivery and evaluation Does not directly refer to teacher, cognitive and social presence.
Martin, 2003 https://doi.org/10.1046/j.1360-3736.2003.00183.x	Organisational Absorptive Capacity for E-learning Model	Not specified, higher education in general	A model for the adoption, diffusion and exploitation of e-learning	**Nature of eLearning technology** - Content - Process - Person embodies **Knowledge of eLearning** - Exposure - Complementaty - Past experience **Outcomes** - Performance imrpovement - Psychosocial contracts **Learner variables and context** - Attitudes to teachnology based learning - Who participates - Who learns **Intgerating meachanisms** - Formal - Informal **Receoptive events and context for change** - Internal - External	Focuses on the factors that can affect the implementation, diffusion and assimilation of e-Learning	This model does not include constant evaluation of teaching and learning processes.

				Institutional and Industry dynamics **Potential** - Aquisition - Assimilation **Realised** - Transformation - Exploitation		
Mnkandla, 2017 https://doi.org/10.19173/irrodl.v18i5.3014	Framework is not named	Not specified	The framework was developed based on the online collaborative learning model. It was necessary to synthesize the knowledge generated in this area to draw conclusions from the use of social media in e-learning in higher education.	Includes 7 themes: - Idea generation - Idea organization - Knowledge building - Social learning - Deep learning - Student support - Learning environment	The framework introduces the importance of integrating social media in higher education as a deep learning strategy.	The framework focuses on students and ensuring that students are supported, safe, and connected in their learning journey. It does not take into account institutional or facilitators needs (e.g., ethical requirement, training of facilitators)
First author, year **Doi, PMID or URL**	**Framework/Model**	**Target audience**	**Description**	**Variables and Sub-variables**	**Strengths**	**Areas for development**
Olmsted, 2010 https://pubmed.ncbi.nlm.nih.gov/20359419/	Not specified	Dental students Healthcare professionals	Adult Learning Theory, Constructivist Theory and Program Outcomes in relation to DL inform 3 major areas of overlapping consideration for the conceptual framework	- Preparing professionals - Adult Learning Theory - Constructivist Theory - Performance outcome	The model suggests a more holistic, multi–dimensional, pedagogical approach	No novel approaches or suggestions relevant for 2020 Does not consider external factors such as ethical and technical requirements

Pecka, 2014
 	
https://pubmed.ncbi.nlm.nih.gov/25109159/
	New Community of Inquiry model	Students
		Registered nurse Anaesthetists
			Integrates Bloom's revised taxonomy into the original Community of Inquiry model and provides a means to design, evaluate, and research higher order thinking in nurse anaesthesia distance education courses	- Social presence
				- Teaching presence
				- Cognitive presence
				  o Triggering
				  o Exploration (Divergent thinking)
				  o Integration (Convergent thinking)
				  o Resolution
					Provides theoretical model to examine critical and higher order thinking in distance learning research priority. Able to measure student's higher knowledge gain as an outcome measure.	Limitations to reaching resolution phase: incorporate specific student learning activities

Picciano, 2017 http://dx.doi.org/10.24059/olj.v21i3.1225	Multimodal Model for Online Education	Learning community	A Multimodal Model for Online Education expands on the Blending with Purpose approach and adds several new components from Anderson and others, namely, community, interaction, and self-paced, independent instruction.	- Content - Social / Emotional - Self-Paced/ Independent Study - Dialectic Questioning - Evaluation / Assessment - Collaboration/Student Generated Content/Peer Review - Reflection	The model has a strong theoretical background as it is based on many of the major attributes of other learning and online education theories and models.	The multimodal model here represents an integrated composite of several theories and model but is essentially a pedagogical model and, therefore, may have greater appeal to instructional designers, faculty, and others who focus on learning objectives.
Pickering, 2017 https://doi.org/10.1080/0142159X.2017.1322189	Twelve tips	Medical education	Twelve tips for developing and delivering a massive open online course in medical education	12 tips: - Enroll on a MOOC to fully appreciate the online Environment - Learn from other MOOC enthusiasts - Develop a MOOC topic that you are passionate about - Recruit a committed and enthusiastic team to support the MOOC's development and delivery - Develop a curriculum map to guide the content development	Provides useful tips for developing an online course in the field of medical education	- Focuses on medical education only - Does not provide a proper model but only a list of 12 tips

				- Create a clear project plan - Create video content based on good educational practice - Construct an appropriate assessment profile - Promote your course with a clear and enticing message - Provide a supportive environment for your learners to interact with - Devise a broad research and evaluation strategy for post-course reflection and improvement - Share your experience to further enhance MOOC Pedagogy		
Ramakrisnana, 2012 https://doi.org/10.1016/j.sbspro.2012.11.356	The study primary aims to explore the challenges associated with the adoption of e-learning models based on student's engagement and interest to learn.	Three distinct e-learning frameworks are sampled for the research	The study adopts a document review methodology, which seeks to perform an extensive review of literature pertaining to the e-learning frameworks. Distinct procedures of data collection are applied within the research methodology including; identification of focus areas, review of documents based on terms, identification of research mode and final analysis of document. Research model identification allows for the exploration of challenges associated with these e-learning models for significant research findings.	Findings indicate the manifestation of e-learning motivation problems among identified e-learning frameworks. The learning process is affected by the content delivery, content structure, student technological background and technological support during learning.	EUT research framework remains associated with diverse challenges manifesting as student motivation to learn	Primary strength of the study is the identification of distinct challenges identified with e-learning models conceptualized by Gupta, S (2006), Packham et al (2004) and Khan (2003). Limited document and e-learning model generates a significantly small sample size for review, which limits the generalizability of research findings.

Redmond, 2018 https://doi.org/10.24059/olj.v22i1.1175	Online Engagement Framework	Engagement within online environments	Five elements of engagement for teaching and learning in the online space: - Social engagement, - Cognitive engagement, - Behavioural engagement - Collaborative engagement - Emotional engagement	- Social: Building community Creating a sense of belonging Developing relationships Establishing trust - Cognitive: Thinking critically, Activating metacognition Integrating ideas Justifying decisions Developing deep discipline understandings Distributing expertise. - Behavioural: Developing academic skills Identifying opportunities and challenges developing multidisciplinary skills developing agency Upholding online learning norms Supporting and encouraging peers. - Collaborative: Learning with peers Relating to faculty members Connecting to institutional opportunities Developing professional networks. - Emotional: Managing expectations Articulating assumptions Recognizing motivations Committing to learning	Can help to critically reflect upon the effectiveness of online courses and their ability to engage students	Framework puts great emphasis on engagement of students in online learning but leaves out other important concepts such as

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Smyth, 2011 https://doi.org/10.1111/j.1467-8535.2009.00990.x	Not named	Not specified	The model distinguishes between planned learner-content interaction and learner-learner interaction and suggests that a blend of planned and non-planned learner-learner interaction is worthwhile. Although these contextual influences are represented by concentric circles, the intent is that they are actually three layers lying a top one another with the influence of the inner circles being more dominant than the outer.	- Contextual influences - Direct influence - Less direct influence - Least direct influence - Content interaction - Knowledge and space formation - Asynchronous interaction - Synchronous virtual interaction - Connectivity	Comprehensive framework that also considers the contextual influences Based on a pedagogical approach	This model does not include constant evaluation of teaching and learning processes.
Sun, 2008	Not named	Not specified	An integrated model comprising of six dimensions, and thirteen variables within the identified dimensions	Six dimensions: - Learners - Instructors - Courses - Technology - Design - Environment	Validated as they conducted a survey to investigate the critical factors affecting learners' satisfaction in e-Learning.	Focuses solely on learners' satisfaction and although the aspects mentioned may equally affect instructors' satisfaction, it does not take instructors' satisfaction into account.
Uppal, 2017 https://doi.org/10.1111/bjet.12552	e-learning quality model	Higher education environment	The research proposes an extended SERVQUAL model, the ELQ model, which in addition to key service constructs, facilitates consideration of both information and system quality factors.	- Service dimension, - Information dimension, - System dimension	The study proposes the extended SERVQUAL model, the ELQ model which concerns with the information and service-quality within the e-learning model.	The study establishes the reliability of the measurement model. However, constructs of measurement of tangibility and responsiveness prove difficult to quantify.

Waterston, 2011 https://doi.org/10.3109/13561820.2011.566647	Not named	IPE healthcare	Contact theory: Changing attitudes and perspectives require contact between members of different groups Conditions necessary for positive result from intergroup contact: Group members should have equal status within contact situation, work on common goals, have support of authorities, they should cooperate with each other Theory of social Interdependence: positive (cooperative) interdependence results in helping others achieve common goal Community of Inquiry model: Critical thinking, cognitive, teaching, and social presence	- Level and equitability of participation - Discourse techniques - Organizational strategies appeared to influence the amount and type of interactivity	The model is based on a three models: - Contact theory - Social interdependence theory - Community of Inquiry model It additionally takes external factors (technical factor) into account.	Focuses on interactivity only.