

MARKETING RESEARCH WITH BLOCKCHAIN CONCEPTS FOR LEARNING OUTCOMES – RESEARCH AND SYSTEM THINKING SDG#4 AND 9.

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Abstract

The purpose of this paper is to explore the steps of applying GLD and QF Level 5 domains to assess the competency level of business undergraduate students' research thinking and system thinking for sustainable development of a research-based course of a QF Level 5 business programme. This paper is to explore the steps of assessing business students on current issues identification for PILOs and CILOs with Generic Level Descriptors (GLD) and AI rubrics. This is managerial relevant to curriculum planning and assessment design. However, quantitative and qualitative research for an assessment framework on QF/ GLD AI rubrics is needed for competency building of business research students

INTRODUCTION

Qualification Frameworks (QF) in Higher Education (HE)

In line with the UNESCO 1998 publication entitled: "World Declaration on Higher Education for the Twenty-First Century: Vision and Action ", it is believed that all education, including higher education, should serve the needs of economic and vocational development. The declaration of UNESCO highlighted that "new vision of higher education is needed to cater to more diversified categories of people, and of its contents, methods, practices and means of delivery, based on new types of links and partnerships with the community and with the broadest sectors of society." As a result, institutes need to have principles in devising their mission for fulfilling the declaration of UNESCO.

Another objective of education is to equip learners with skills and attitudes for the workplace. Hence, a new requirement on vocational competence has emerged. Bohlinger (2008) mentioned that the introduction of a qualifications framework (QF) is to make national educational systems more transparent, more innovative and more competitive. Besides, it can also help improve the match between the educational system and the labor market. Thus, "QFs are seen as engines of innovation: the point of introducing them is to promote a number of fundamental, long- term reforms." (Bohlinger, 2008, pp. 96) He further pointed out that unlike national QFs, it addresses priorities of the European Union

and does not include binding mechanisms of recognition addressed to individuals.

Recently, Pless et al. (2012) promoted the use of integrated service learning with involvement of non-governmental organizations (NGOs) and social entrepreneurs to bring insights to learners. “Understanding how participants make sense of, and learn from, their experiences abroad provide us with insights into how service-learning programs can help managers to develop the knowledge, skills, and mind-set that will enable them to successfully support a company’s global sustainability and corporate social responsibility (CSR) efforts.” (2012, p.1) Hence, a comprehensive qualification framework needs to embed the rationale of integrated experiential service learning when developing different kinds of skill sets for learners, aiming to broaden, deepen and expand their horizon with a focus on responsibility and sustainability in this dynamic world.

In Hong Kong, the Qualification Framework (QF) was born in 2008. Based on the information released from the Education Bureau (EDB), the aim of having QF is to help people in Hong Kong to set a goal for life-long learning with qualifications assured through the seven levels of qualifications covering academics, vocational and continuing education. The QF levels help visualize an articulation ladder for the learners.

Levels 1- 3 cover programmes in certificate levels while levels 4-7 cover programmes from diploma, undergraduate degree to master degree and doctoral degree levels. In each level, there are two to six descriptors under each category to measure the learning outcomes of modules in a programme. These descriptors are classified into the following four categories as shown in the following table of level 5 – undergraduate level provided by The Hong Kong Council for Academic Accreditation and Vocational Qualifications (HKCAAVQ):

- Knowledge & Intellectual Skills;
- Processes;
- Application, Autonomy & Accountability; and
- Communication, IT and Numeracy.

Table 1 Generic level descriptors - Level 5

Knowledge & Intellectual Skills	Processes	Application, Autonomy & Accountability and	Communication, IT and Numeracy
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• Generate ideas through the analysis of abstract information and concepts • Command wide ranging, specialised technical, creative and/or conceptual skills • Identify and analyse both routine and abstract professional problems and issues, and formulate evidence-based responses • Analyse, reformat and evaluate a wide range of information • Critically analyse, evaluate and/or synthesise ideas, concepts, information and issues • Draw on a range of sources in making judgements.	• Utilise diagnostic and creative skills in a range of technical, professional or management functions • Exercise appropriate judgment in planning, design, technical and/or supervisory functions related to products, services, operations or processes.	• Perform tasks involving planning, design, and technical skills, and involving some management functions • Accept responsibility and accountability within broad parameters for determining and achieving personal and/or group outcomes • Work under the mentoring of senior qualified practitioners • Deal with ethical issues, seeking guidance of others where appropriate.	• Use a range of routine skills and some advanced and specialized skills in support of established practices in a subject/discipline, for example: • Make formal and informal presentations on standard/mainstream topics in the subject/discipline to a range of audiences • Participate in group discussions about complex subjects; create opportunities for others to contribute • Use a range of IT applications to support and enhance work • Interpret, use and evaluate numerical and graphical data to achieve goals/targets.
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The QF of programmes delivered by institutes is assessed by an independent party named HKCAAVQ through programme validation exercises. The HKCAAVQ was established in 1990 as an independent statutory body to provide authoritative advice to the Hong Kong Government on academic standards of programmes, including sub-degree, and secondary as well as vocational qualifications in the higher education institutions.

The role of HKCAAVQ in the QF area is to assure the quality of the learning programmes. As an accreditation authority of QF, the HKCAAVQ assesses the programmes provided by institutes (programme providers) from the following perspectives:

1. Achieving stated educational objectives;
2. Operating learning programmes; and
3. Meeting the required standards to achieve stated learning outcomes with reference to the Generic Level Descriptors (GLD) of QF.

Quality Tools for Quality Indicators

Quality by itself is neutral (Conti, 2013). The value of quality is interpreted from the

eyes of customers in terms of fulfilling requirements with unique characteristics of the products and/ or services delivered. Conti (2013) mentioned that the value judgment was always expressed by people and derived by the associated attributes to the word quality. He further pointed out that the scope of the quality management concept suffered from missing strategic content of which many of today's quality practitioners have tried to identify quality management with defect reduction (doing things right). There is an increasing emphasis on using statistics in reducing variations in processes for maintaining management system performance and for proving a fit-for-purpose system. If GLD QF level 5 is used to measure the learning outcomes of the above mentioned case on market research with blockchain concepts in the kidwear apparel industry, what are the steps that we can identify learning outcomes of students in terms of research thinking and system thinking?

Case Study – Market Research with Blockchain Concepts for Research and Systematic Thinking

In 2025, the revenue in the Children's Apparel market in HK amounts to HKD US\$3.10bn. The youth apparel market has developed very rapidly in recent years, and consumers have increasingly higher requirements for product quality, brand authenticity, and personalized customization. However, the current industry faces various challenges, such as low transparency in the supply chain, product authenticity, and insufficient supervision of the environment and labor rights during the production process. Blockchain technology, due to its decentralized, tamper-proof, and traceable characteristics, provides new possibilities for solving these problems. By leveraging blockchain labels, children's clothing brands can enhance their brand strategies and build stronger customer relationships.

Objective:

1. Analysis of the application potential of blockchain technology in supply chain management, product traceability, brand protection and other aspects of the teenager clothing apparel industry.
2. Evaluate the impact of blockchain technology on the operational efficiency, cost structure and consumer trust of the teenager clothing industry.
3. Propose innovative business models and development strategies for the teenager clothing industry based on blockchain technology

Research methods

1. Literature research method: collect academic literature, industry reports and case studies on the application of blockchain technology in the apparel industry and related fields at home and abroad, and sort out existing research results and practical experience.
2. Questionnaire survey method: design a questionnaire for young apparel consumers to understand their awareness and acceptance of blockchain technology, as well as their views and expectations on the current status of the industry. Through data collection and statistical analysis, understand the pain points of the industry and consumer

needs.

3. Interview method: interview young parents to obtain their professional opinions and views, and provide multi-angle thinking and suggestions for the research.

Key concepts of market research

In the teenager clothing industry, market research can help brands understand consumer preferences, market trends and competitive dynamics. use questionnaires to study consumer behavior:

1. Consumer behavior analysis: understand parents ' purchasing decisions and their emphasis of attention paid to blockchain technology . For example, parents born in the 1970s and 1980s are more concerned about the safety of teenager clothing materials (such as organic cotton and harmless dyes) and functional design and sustainability. Parents also focus on environmentally friendly materials, prices, brand loyalty and purchasing channels, such as brand stores, online shopping, street shops, etc. Understand whether parents pay attention to environmental protection and sustainable development . For example use a questionnaire to ask, Have you ever heard about recycling old clothes into new ones? If a company were to remake recycled children 's clothing into new children 's clothing, h

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2. Market segmentation: For teenagers aged 13-15 parents pay more attention to comfort and safety. For teenagers aged 16-19, parents emphasize individuality and fashion elements. What are their parents' biggest concerns about applying blockchain to youth products? What should youth brands prioritize when implementing blockchain?
3. Competitive analysis: Evaluate competitors ' strategies, strengths and weaknesses, and identify opportunities for differentiation. For example, Nike combines dynamically encrypted NFC chips with blockchain technology and applies them to the traceability of children 's clothing products. Consumers can scan the code label to view

blockchain certification such as product style, production batch, logistics path, etc., which is effective and improves consumer trust.

4. Product positioning: Define how the brand 's teenager clothing stands out in quality design and using blockchain technology.
5. Customer feedback: Collect and analyze feedback to improve products and services.

As market research results in the teenager clothing industry showed, more and more consumers are concerned about the source and manufacturing process of products. Blockchain is a safe, transparent and tamper-proof technology. The core advantages include:

1. Transparency: Record the process data of children 's clothing from raw materials to finished clothes. Consumers can scan the code to trace and solve the problem of anti-counterfeiting.
2. Traceability: Consumers can verify such as organic cotton certification, production factory environmental rating, quality inspection records, etc. by scanning the code. Enhance parents ' trust in product safety and promote purchasing decisions. Each transaction or data is accompanied by a time, so that data can be tracked.
3. Unalterable: Once data is recorded on the blockchain, it cannot be changed or deleted.
4. Decentralization: Build a decentralized data platform to integrate consumer preferences, market trends, and drive smart contracts to automatically match demand.

Blockchain labels are attached to teenager clothing products to provide consumers with detailed information on the entire process of the product from raw materials to the retail industry. This innovation meets consumers ' demand for transparency and brand trust.

1. Transparency in the supply chain: Consumers can verify the source of fabrics to ensure that the source is ethical and does not contain harmful chemicals. Blockchain can follow the flow of products, reduce the risk of counterfeiting and ensure timely delivery. Brands can demonstrate compliance and safety standards.
2. Traceability for quality assurance: Parents can trace the entire process of the product. If a product is recalled due to safety issues, blockchain can quickly identify the affected batches. This minimizes the risk to consumers. Brands can prove compliance with international safety standards, and this traceability not only enhances consumer confidence, but also strengthens the brand 's reputation for quality and safety.
3. Data marketing: Analyze consumer preferences based on blockchain interactions and predict children 's clothing trends. Designers can adjust product lines for the next season. Combined with data such as inventory turnover and regional consumption capacity recorded by blockchain, implement flexible pricing strategies. For example, unsaleable items are automatically reduced in price based on real-time supply chain costs, and personalized coupons are pushed to historical customers through eCRM.

Applying QF Level 5, Generic Descriptor Level, and AI Rubrics to Assess Undergraduate Research and System Thinking

Effective assessment of undergraduate competencies in research related courses of a business programme at QF level 5 with research thinking and system thinking as learning outcomes, we need to a clear understanding of GLD and four dimensonsof QF level 5 of learning. The Qualification Frameworks (QF), especially at Level 5, along with the Generic Descriptor Level (GDL), and innovative AI Rubrics, provide a holistic assessment framework for business students' higher-order thinking skills. This paper is to explores how these frameworks to assess undergraduate business students on conducting a reseach on blockchain technology concepts applied in the kidwear apparel industry for sustainable development.

Understanding QF Level 5 and the Generic Descriptor Level

The Qualification Framework (QF) serves as a national or institutional standard for defining learning outcomes associated with specific levels of education. According to the Australian Qualifications Framework (AQF, 2013), Level 5 corresponds to post-secondary education that develops learners' abilities to analyze, evaluate, and synthesize knowledge within familiar contexts, often through structured projects or research. This level emphasizes competence in applying knowledge to solve complex problems, demonstrating autonomy, and contributing to professional practices. The Generic Descriptor Level (GDL), often aligned with QF levels, offers a broad characterization of the expected graduate capabilities at each qualification level (QAA, 2014). For Level 5, the GDL typically encompasses the capacity for independent learning, critical analysis, and the application of knowledge within professional or academic settings. These descriptors provide a benchmark for assessors to determine whether students have achieved core competencies such as research skills, analytical reasoning, and system thinking.

Research Thinking and System Thinking in Undergraduate Education

Research thinking involves the ability to identify issues under a dynamic business landscape which impacts on business performance wth specific and measurable research questions (RQs), qualitative and quantitative data collection, and findings interpretation from a higher-order system thinking in a critical mindset for feasible solutions. It underpins the development of evidence-based knowledge with objective and analytical skills to identify solutions for RQs. In ISO concept, system thinking refers to plan, do, check, act (PDCA). For business mindset, it refers to a complex and interconnected systems with environmental, social, technological, and governance or PESTLE concepts (political, economic, social, technological, legal and environmental. This has been mentioned by Sterman, 2000 on the key elements in a system. Both PDCA and PESTLE skills are integral to preparing business undergraduates for developing innovative solutions to tackle real-world challenges for sustainable development.

Applying QF Level 5 and GLD to Assess Research and System Thinking

Assessment at QF Level 5 should focus on students' capacity to demonstrate autonomous research initiatives, critical evaluation, and holistic understanding of complex systems. For example, a capstone project with contemporary issues of blockchain technology and AI applications may help business students to investigate a real-world issue with multiple reliable data sources for reaching objectives of a capstone project and RQs, aligning with Level 5 competencies.

Using the GLD as a reference, assessors can evaluate whether students exhibit the following:

- **Autonomy:** Ability to independently plan and execute research activities.
- **Critical analysis:** Evaluation of sources, identification of assumptions, and synthesis of diverse perspectives.
- **Application:** Applying theoretical knowledge to practical scenarios, including system analysis.

Rubrics derived from these descriptors might include criteria such as clarity of research questions, depth of analysis, integration of interdisciplinary concepts, and awareness of system dynamics. For instance, a student demonstrating a nuanced understanding of how different components of a social system interact would exemplify system thinking aligned with Level 5 expectations.

Exploration of MIT AI Rubrics in Enhancing Assessment

The Massachusetts Institute of Technology (MIT) has pioneered the development of AI-driven rubrics that leverage machine learning algorithms to evaluate student work with high consistency and objectivity (MIT, 2023). These rubrics can be tailored to assess complex cognitive processes, including research and system thinking, by analyzing textual data such as research reports, essays, or project reflections. MIT's AI rubrics often incorporate criteria aligned with Bloom's taxonomy—covering analysis, synthesis, and evaluation—and can be designed to detect indicators of higher-order thinking. For example, the rubrics may analyze the coherence of argumentation, the depth of systemic analysis, or the originality of insights, providing detailed feedback that guides students toward improved performance.

Integrating Frameworks and Rubrics for Holistic Assessment

Combining the QF Level 5 standards, GDL descriptors, and MIT AI rubrics offers a comprehensive approach to assessing undergraduate competencies:

- **Alignment with Learning Outcomes:** First of all, brief business students on the expectation and programme intended learning outcomes (PILOs) and research-based course learning outcomes (CILOs) of the case research on blockchain application in kidwear apparel market with assessment requirements at QF level 5 and GLD measure the intended skills of research and system thinking. (<https://hkqf.gov.hk/files/record/qf-lvl->

resources/6/The%20revised%20GLD%20and%20the%20Explanatory%20Notes_Eng_April_2018-1703059799.pdf)

- **Objectivity and Consistency:** Secondly, explore research-based AI rubrics on assessment on students' abilities on critical thinking – critically assess the information provided by AI and the quality of AI information on the current market in kidwear with blockchain technology applied for business returns and adapted into assessments with originality and self reflection on learning experiences to enhance objectivity and reliability.
- **Feedback for Development:** Thirdly, list and explain the choice of adopted AI tools in a research-based course with formative and summative explanation from a self learning perspective, encouraging students to refine their analytical and systemic reasoning skills on PDCA and PESTLE.

For example, a research project on environmental sustainability could be assessed using a rubric informed by QF Level 5 and GLD, focusing on students' ability to formulate research questions, analyze systemic interactions among ecological, social, and economic factors, and synthesize findings into actionable recommendations. The AI rubrics and AI tools could help to analyze the depth of learning of students in terms of 1) systemic analysis, 2) the coherence of argumentation, and 3) the originality of proposed solutions from data analysis.

Challenges and Considerations

Integrating the QF Level 5 descriptors and GLD and AI rubric into a framework for assessing business students' PDCA and PESTLE mindset and research thinking/ systemic thinking generate benefits of self-learning. However, the challenges that need to face, probably are reliability of AI tools and AI rubrics to ensure they accurately interpret qualitative data and do not reinforce existing biases (Baker & Smith, 2019).

Furthermore, educators must ensure that PILOs/ CILOs/ Ai rubrics are easy-to-understand and aligned with curriculum goals and the mission of the school as a whole

Conclusion

Applying QF Level 5 standards, the Generic Level Descriptor (GLD), and AI rubrics offers a multifaceted approach to assessing undergraduate research thinking and system thinking. These frameworks need to be generally accepted in benchmark higher education institutions and aligned with desired graduate capabilities in certain countries. Integrating traditional descriptors with innovative AI tools may be a trend that need to have more research to support their validity, reliability, and richness of student assessments.

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