Discover Education

RESEARCH Open Access

Leveraging Taiwan's competency-based curriculum model: implications for low- and middle-income countries

Gulled Mohamed Yasin[1*]

*Correspondence:
Gulled Mohamed Yasin
gulled.yasin@uoh.edu.so
[1]School of Graduate Studies, University of Hargeisa, Hargeisa, Somalia

Abstract

This qualitative study examined how Taiwan's 12-Year Basic Education Competency-Based Curriculum (CBC) was designed and implemented and what elements are transferable to low- and middle-income African contexts. The researcher triangulated five national policy/curriculum documents with 15 key-informant interviews (professors, principals, and policymakers) who had direct involvement in the CBC design, development and reforms and analyzed data using thematic analysis. In this regard, the research identified several core themes. A decentralized, bottom-up approach was fundamental, engaging a wide spectrum of stakeholders including educators, parents, industries, and communities in a multi-year co-design process. Competencies were contextualized from global frameworks (OECD DeSeCo) and systematically woven into both national mandates and school-based curricula to ensure local relevance. Implementation was underpinned by systemic, government-funded teacher professional development focused on shifting pedagogical practices and a move toward authentic assessment tools to measure holistic student growth. Furthermore, the curriculum was explicitly tailored to economic needs through strategic industry-education partnerships. Despite the participatory design, challenges included resistance from teachers accustomed to exam-centric instruction. The study concludes that Taiwan's CBC is not a one-size-fits-all model but offers a transferable blueprint for context-responsive reform when adapted to local capacity, culture, and equity priorities.

Keywords Competency-based curriculum, Taiwan, Africa, Curriculum reforms

1 Introduction

In 1990s, employing grassroots approach, the civil society groups exerted a pressure to the government to undertake education reforms in Taiwan. This became the turning point of Taiwan education The civil society lobbied their rights of participating in the education reforms. In 1994, a mass demonstration was staged by middle class citizens, demanding for major education reforms that eliminate the unreasonable constraints and controls imposed by the authoritarian government. Lobbyists called for drastic action in cooperation with the legislators to make concessions on the education reforms

© The Author(s) 2026. **Open Access** This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit http://creativecommons.org/licenses/by/4.0/.

legislation. In light of the urgent need for substantial measures, the circumstances prompted the premier to authorize the formation of a specialized Council on Education Reform (CER) at the cabinet level in September 1994.

Guided by the constructivist approach, this curriculum made substantial pedagogical and structural changes to foster basic skills and alleviate the narrow measure of test-driven practices by developing multiple ways of measuring student academic performance. More so, the entrance exams were primarily paper-and-pencil assessments emphasizing factual knowledge, which in turn drove junior and senior high school instruction to center on knowledge acquisition and memorization. Teachers mainly passed on information from textbooks, and students relied heavily on rote memorization and drill exercises, often receiving test-focused instruction. Due to the competitive nature of these exams, many students attended after-school programs or cram schools to refine their test-taking strategies. This emphasis on testing not only caused significant stress for learners but also led to a rigid education system and a growing disconnect between schooling and societal progress [10].

Furthermore, the nine-year curriculum was developed in line with the global shift toward competency-based education, identifying "fundamental competencies" as the essential knowledge and skills that all Taiwanese students should possess to succeed in the modern era [13]. Building on these "fundamental competencies" and the "core competencies" specified in the General Curriculum Guidelines for Senior High School while maintaining alignment with international competency standards the twelve-year curriculum introduced a competency framework with nine "core competencies," encompassing indicators for all grade levels and subject areas [41].

On the other hand, many low socio-economic nations, African countries, for example, such as Kenya, Tanzania, Uganda, South Africa, Rwanda and others still struggle for the implementation of CBC [26]. The challenges include: inadequate teacher training, limited resources, including shortages of textbooks, digital tools, and adequate infrastructure, resistance to change, infrastructural deficits such as inadequate classroom space and unreliable internet connectivity complicate the delivery of CBC-aligned education [12].

Therefore, this study aims to explore the competency-based curriculum of Taiwan by looking at these three main objectives:

1. To explore the mechanisms of competencies integration in Taiwan curriculum reforms.
2. Explore the extent to which the curriculum responds to labor market demands.
3. Explore the implementation strategies of the competency-based curriculum in Taiwan.

2 Review of related literature

2.1 Theoretical foundations: from constructivism to competencies

Competency-based curriculum (CBC) draws on constructivist views of learning that emphasize active knowledge construction through problem-solving, social interaction, and authentic tasks. Cognitive constructivism highlights developmental stages and discovery [8, 52] while socio-constructivism stresses mediation, scaffolding, and the zone of proximal development [61]. Dewey J 17] "learning by doing" connects school knowledge to real-world inquiry. Contemporary competency frameworks translate these ideas

into integrated capabilities (knowledge, skills, values, dispositions) demonstrated in performance, shifting assessment from recall toward evidence of transfer [2]; National Research [25, 46]. This theoretical lineage underpins Taiwan's CBC anchored in core competencies and cross-curricular design and guides the analysis of how design choices translate to system-level and classroom-level practice.

2.2 Taiwan's CBC: design signals relevant to transfer

In this study, transfer refers not to the direct replication of Taiwan's competency-based curriculum model, but to the selective adaptation of specific systemic mechanisms such as competency frameworks, assessment moderation, exemplar task systems, and professional learning community structures—into low- and middle-income contexts, taking into account local institutional capacity, assessment regimes, and resource constraints. Taiwan's 12-Year Basic Education reform articulates core competencies that cut across subjects, provides cross-curricular themes, and grants school-level curriculum planning autonomy within a national legal/policy scaffold and guidance documents [41]. Descriptive accounts consistently note (a) broad stakeholder consultation, (b) phased roll-out, (c) emphasis on authentic assessment and project work, and (d) teacher collaboration structures (PLCs/NLCs) that enable school-based design. What remains under-examined in the literature and what this study addresses is how these levers were coordinated in practice and which design elements are transferable to lower-resource systems without importing the model wholesale.

2.3 CBC in africa: convergence of aims, constraints, and enabling conditions

Across the continent, the Continental Education Strategy for Africa 2016–2025 (CESA 16–25) urges member states to re-orient education toward competencies for work and citizenship, with teacher development and assessment reform as central levers (African [1]. In this Specifically, the education policies of some African countries like Kenya, Rwanda, Ghana and others articulate core competencies, school-based curriculum structures, and revised assessment approaches aligned with CBC principles.

- Kenya adopted the Basic Education Curriculum Framework (defining seven core competencies, promoting school-based curriculum design, and institutionalizing competency-based assessment through KNEC's frameworks for continuous assessment (KICD, [34]). Early analyses point to strong stakeholder engagement but persistent challenges around teacher workload, time for task design, and assessment stabilization.
- Rwanda's competence-based curriculum emphasizes coherence across levels, explicit cross-cutting competencies, and revised Teacher Training College (TTC) preparation and implementation manuals; implementation literature highlights the need for assessment literacy and classroom exemplars to sustain fidelity [57].
- Ghana's Standards-Based Curriculum foregrounds inquiry, key competencies, and assessment for learning, with progress reported alongside calls for stronger teacher support, task banks, and moderation routines (National [45, 45].
- South Africa's transition from Outcomes-Based Education to CAPS illustrates how teacher workload, moderation capacity, and high-stakes exam alignment shape classroom practice and can decouple policy from pedagogy if not addressed (Department of Basic Education, [21], [31].

A cross-cutting message from African and international reviews is that CBC effectiveness hinges on assessment alignment and teacher collaboration time; where either is absent, competency rhetoric remains aspirational [32, 50].

2.4 Objective one: to explore the mechanisms of competencies integration in Taiwan curriculum reforms

The literature identifies several levers for embedding competencies across a system: (i) a national competency framework with learning progressions and explicit links to subjects; (ii) cross-curricular themes (e.g., citizenship, career development) to avoid siloed delivery; (iii) concrete exemplars task banks, rubrics, and moderation guidance; and (iv) collaborative teacher structures (PLCs/NLCs) with time-tabled co-planning and inquiry [15, 18]. Case reports from African reforms frequently document the frameworks but note thin exemplification and limited collaborative time, producing uneven classroom uptake [34, 45]. Taiwan's model speaks directly to these issues by pairing school autonomy with guidance artifacts (exemplars, toolkits) and normed collaboration, design choices that these findings examine for feasible adaptation in lower-resource contexts [41].

In this objective, the researcher wanted to discover how various generic and local needs reflective competencies are integrated in the various curricular documents such as the learning areas or subjects. According to [41] the, the new curriculum guidelines set forth by the government focuses on key areas including;

- Inspiring students to unleash their full potential.
- Teach and develop students' knowledge about life.
- Promote students' career development.
- Inculcate students' civic responsibility.

Before the adoption of competency-based curriculum, Taiwan was practicing test-driven pedagogical practices in which parents were solely pursuing high score attainment of their children in the high-stake tests [10]. These test-centric teaching practices not only placed significant stress on students but also led to a rigid educational system and a growing disconnect between school education and societal development [62].

The 12-Year Basic Education system, core skills serve as the foundation for crafting curricula, ensuring a seamless transition between educational phases, connecting various knowledge areas, and merging subjects together [41]. Core competencies are mainly implemented in the standard subjects and general domains within elementary, junior high, and upper secondary schools. Figure 1 illustrates the core competency framework centering on a lifelong learner who develops core competencies in the three categories—pontaneity, communicative interaction, and social participation [41].

Figure 1 presents the structural logic of Taiwan's core competency framework, illustrating how the three overarching domains—spontaneity, communicative interaction, and social participation interact dynamically around the lifelong learner.

Table 1 Operationalizes Taiwan's competency framework across learning domains, demonstrating how transversal competencies are systematically embedded within both subject-specific and interdisciplinary curriculum structures.

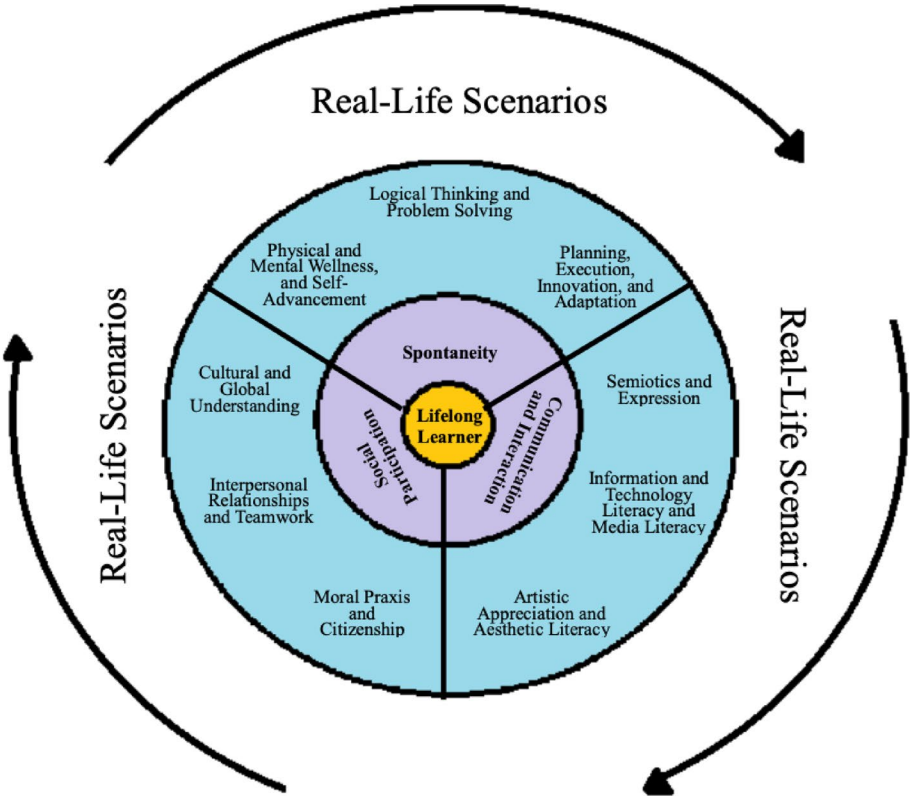

Fig. 1 Wheel-in-action diagram of core competencies. (MOE, [41])

Table 1 The competency framework of the twelve-year curriculum (MOE, [41])

Categories	Competencies
Self-directed action	1-1 a sound body and mind and self-improvement 1-2 systematic thinking and problem-solving 1-3 planning, implementing, and creative flexibility
Communicative interaction	2-1 use of symbols and communicative expression 2-2 Technology, information, and media literacy 2-3 arts and aesthetic competency
Social participation	3-1 interpersonal relations and teamwork 3-2 multicultural and international understanding 3-3 moral practice and civic consciousness

2.5 Assessment-driven implementation mechanisms: a holistic approach

Curriculum competencies in Taiwan represent a departure from traditional educational models that emphasize rote learning and subject-specific knowledge [10]. Instead, the focus is on nurturing well-rounded individuals capable of addressing real-world challenges. The Ministry of Education in Taiwan has actively promoted this shift, highlighting the importance of competencies such as critical thinking, communication skills, digital literacy, and social responsibility [36]. This integrated approach encompasses not only academic disciplines but also the development of essential life skills and character education.

2.6 Objective two: explore the extent to which the curriculum responds to labor market demand

Evidence is in place that CBC improves employability require institutionalized industry participation (advisory roles, periodic curriculum review), work-based learning (internships, project partnerships), and embedded career guidance [49]. Evidence suggests that generic competencies (communication, teamwork, problem-solving) improve when task design and assessment criteria explicitly target them otherwise they remain aspirational [25]. Taiwan formalizes structured stakeholder engagement and periodic updates; African systems report emergent but uneven partnerships, especially outside urban centers, due to employer capacity, logistics, and safeguarding concerns. This study translates these insights into sequenced steps for LMIC settings (e.g., starting with school-industry projects and regional advisory groups, then scaling to internships as capacity grows).

The issue of curriculum responsiveness in labor market demands and employability has become the core debate in recent decades. Educational institutions often face pressure from policymakers, politicians, and the public to tailor their programs to meet economic and societal demands. This pressure intensifies in times of social change, especially in regions struggling with high unemployment rates. Additionally, enhancing the alignment of educational supply with the requirements of the labor market is among the recommendations put forth by the European Commission in 2013 [43].

According to [43], the research of how distinct skills are demanded in the job market is an emerging research domain within labor economics. Recent findings indicate that both discipline-specific skills and generic competencies are crucial for graduates seeking employment.

2.7 Objective three: to explore the implementation strategies for the competency-based curriculum in Taiwan

According to literature, one of the primary policy instrument for the implementation of curriculum is the assessment strategies. Assessment that drives instruction is a persistent finding across systems [2, 50]. Effective CBC adoption therefore invests in classroom assessment literacy (valid task design, analytic rubrics, moderation/calibration) and in policy signals that value formative evidence. Teacher professional development that is ongoing and school-embedded rather than one-off workshops produces stronger fidelity to competency-based pedagogy [15] Timperley et al.[59]. Governance strategies that support reform durability include phased pilots, iterative consultation, protected school autonomy with clear accountability for curriculum quality, and resource scaffolds (exemplar banks, moderation routines, micro-credentialed PD). African experiences (e.g., South Africa's trajectory and World Bank analyses of exam systems) illustrate that without these supports, high-stakes examinations will dominate practice and crowd out competency-aligned pedagogy [31, 32].

2.8 Research gap

Prior scholarship often describes CBC policies or provides single-classroom vignettes. Less common are studies that triangulate system-level policy with practitioner evidence to identify implementation mechanisms and spell out transfer conditions for LMICs. In organizing this review (and the study's findings) around three actionable objectives competency integration, labor-market responsiveness, and implementation strategies,

the study links Taiwan's design choices to feasible adaptations in African contexts, clarifying the preconditions (assessment alignment, teacher collaboration time, stakeholder engagement) that increase the likelihood of successful transfer [1]. The study therefore investigates mechanism-level transferability rather than system-level replication, focusing on reform components that may be structurally feasible within African public education systems.

2.9 Research method

The study employed a qualitative descriptive design combining document analysis and semi-structured key-informant interviews to explain *how* Taiwan's competency-based curriculum (CBC) was coordinated across levels and which elements are transferable to resource-constrained systems. Qualitative description produces practice-proximal accounts of actors, activities, and conditions [58]. The researcher analyzed texts with document analysis [4] and interview data with reflexive thematic analysis (RTA) [6] which supports inductive patterning and researcher reflexivity suited to mechanism-tracing.

Table 2 summarizes the purposive sampling logic, data sources, and analytical rationale guiding document and interview selection. In the realm of qualitative research, 14 the selection of participants or settings that can most effectively help researchers in comprehending the research question is done deliberately. Therefore, 15 respondents (professors and principals) with first-hand information on the curriculum reforms of Taiwan had been purposively selected for the study. Hennink M [29] state that qualitative sample sizes reach for saturation between 9 and 17 interviews.

2.10 Data collection tools

The data collection tools for this study were mainly key informant interviews and document reviews.

A. Document review

Table 2 Sampling procedure summary of data sources, sampling, and rationale

Data source type	Specific source/group	Sampling method	Sample size	Rationale
Documentary sources				
Documentary sources	Curriculum Guidelines of 12-Year Basic Education; Education in Taiwan (MoE); Advancing 21 st Century Competencies in Taiwan; Educational Fundamental Act 19; White Paper on Teacher Education	Purposive	5 documents	Key policy texts capturing CBC design/implementation over ~ 2 decades
Key informant interviews				
Professors & principals	Curriculum professors/experts ($n = 10$) and principals from model schools ($n = 5$) with first-hand CBC experience	Purposive	15 respondents	Information power & saturation targeted; aligns with [29] range (≈ 9–17)

Total: 20 sources (5 documents + 15 interviews) – triangulation via document analysis and expert interviews.

KII Key Informant Interview, *CBC* Competency-Based Curriculum, *MoE* Ministry of Education.

Saturation guidance: [29] suggest saturation commonly occurs between 9 and 17 interviews for focused qualitative questions.

Table 3 Themes at a glance: themes, subthemes, coverage, sources, and quotes

Theme	Subtheme	Objective	Data sources	Coverage	Quote ID(s)
Coherent competency integration with worked exemplars and moderation	General & subject-specific competency integration	Objective 1	KIIs (Professors, Principals); Guidelines	Most KIIs	KII-Prof-03; KII-Principal-02
Coherent competency integration with worked exemplars and moderation	Exemplar banks and moderation routines (calibration)	Objective 1	KIIs (Professors, Principals); MoE Policy document	Many KIIs	KII-Prof-07; KII-Principal-04
Coherent competency integration with worked exemplars and moderation	Assessment rubrics and acceptable-evidence anchors	Objective 1	KIIs (Professors); Assessment Guidelines	Some KIIs	KII-Prof-05; KII-Prof-08
Structured interfaces with the labor market via advisory inputs and work-based learning	Advisory boards/industry input to curriculum updates	Objective 2	KIIs (Professors); MoE Policy document	Many KIIs	KII-Prof-02; KII-Prof-06
Structured interfaces with the labor market via advisory inputs and work-based learning	Internships/practicals and school–industry placements	Objective 2	KIIs (Principals); School program notes; MoE Policy document	Some KIIs	KII-Principal-01; KII-Principal-05
Structured interfaces with the labor market via advisory inputs and work-based learning	Uneven alignment across sectors and locales (negative cases)	Objective 2	KIIs (Professors)	Few KIIs	KII-Prof-01
Bottom-up implementation supports: protected collaboration time and school-level planning	Protected PLC time and observation cycles	Objective 3	KIIs (Principals); School schedules	Most KIIs	KII-Principal-03; KII-Principal-06
Bottom-up implementation supports: protected collaboration time and school-level planning	School-level planning, vision alignment, and parent engagement	Objective 3	KIIs (Principals); School plans	Many KIIs	KII-Principal-02; KII-Principal-07
Bottom-up implementation supports: protected collaboration time and school-level planning	Resistance rooted in exam legacies; mitigation strategies	Objective 3	KIIs (Professors, Principals); MoE Policy document; Act	Some KIIs	KII-Prof-04; KII-Principal-05

Document review is a method used to retrieve data by scrutinizing pre-existing written records [44] and in this study it provided core evidence for all three research objectives and the overarching goal of theorising transferable features of Taiwan's competency-based curriculum (CBC) model for low- and middle-income contexts. Specifically, the national policy texts were used to (a) map the CBC competency architecture and assessment logic (Research Objective 1), (b) identify how the curriculum formally frames key competencies, employability, and links to economic and labour-market priorities (Research Objective 2), and (c) trace the governance, teacher professional learning, and implementation levers through which the CBC is enacted system-wide (Research Objective 3). The study analyzed five (5) national documents meeting four inclusion criteria: (a) national scope; (b) authoritative status (law/regulation/guideline); (c) direct relevance to competencies, assessment, teacher professional learning, or curriculum governance; and (d) most recent version available. Each document was abstracted with a standardized checklist capturing: citation metadata; scope/authority; competency architecture; assessment guidance (formative/summative; rubrics; moderation); teacher PD/PLCs; governance/implementation levers (autonomy, accountability, phasing); and recency/updates. The *Curriculum Guidelines of 12-Year Basic Education (General Guidelines)* served as the anchor policy text.

B. Key Informant interviews

The researcher interviewed 15 key informants (10 curriculum professors/experts; 5 principals from model schools) via purposive, maximum-variation sampling to capture role heterogeneity. Inclusion criteria were direct involvement in CBC design/teacher preparation or school-level implementation, more than 10 years' relevant experience, and capacity to be interviewed in English. The study carried out ~12–18 interviews; The sample size was $N = 15$ when information power and pragmatic saturation were met [24, 39].

2.10.1 Interview guides: role-specific domains and core questions

- Principals/head-teachers: 6 domains (curriculum mapping & leadership role; school-level curriculum development & participants; implementation activities & monitoring; conveying required competencies & outcome indicators; parent roles; communication channels with MoE). These mapped to 11 core questions with probes (e.g., assessment artifacts, moderation routines). Representative prompts are documented in the principals question set.
- Professors/scholars & policy/National Academy for Education Research (NAER) experts: 6 domains (integration architecture and general guidelines; subject/task-force processes; labor-market tailoring & industry participation; implementation strategies including teacher professional development and pilot schools; needs-assessment processes; stakeholder engagement & consultation). These mapped to 12 core questions with probes. Representative prompts are documented in the Research Questions set.

2.11 Data analysis techniques

Qualitative researchers typically employ an inductive approach, where they construct patterns, categories, and themes from the ground up by systematically organizing the data into progressively more abstract units of information [28].

This study employed reflexive thematic analysis (RTA) as articulated by [5, 6] to analyze both key informant interview (KII) transcripts and national policy documents. RTA was selected because it is well suited for mechanism-tracing, interpretive qualitative inquiry, particularly for examining how complex curriculum reforms such as competency-based curriculum (CBC) are designed, enacted, and stabilized across system levels.

2.11.1 Phase 1: data familiarization

All 15 interview recordings were transcribed verbatim by the researcher. Each transcript was read repeatedly alongside the five national policy documents to ensure deep immersion in the full data corpus. During this phase, reflexive analytic memos were generated to document early observations related to competency integration, labor-market alignment, assessment reform, teacher professional development, stakeholder participation, and institutional resistance.

2.11.2 Phase 2: initial coding

A manual, inductive, line-by-line coding process was undertaken across all interview transcripts and policy documents. Codes were generated directly from participant language and official policy phrasing, rather than from pre-established analytical categories. Examples of early codes included:

- Competency harmonization
- School autonomy boundaries
- Assessment credibility pressure
- Exam-based instructional resistance
- PLC-enabled task design

Document analysis followed the same coding logic to ensure analytic symmetry between policy intent and practitioner enactment.

2.11.3 Phase 3: code clustering and pattern development

Related codes were systematically grouped into broader pattern categories using constant comparison across:

- Professors versus principals.
- Policy texts versus school-level accounts.

For example, codes relating to *rubrics*, *moderation*, *exemplar banks*, and *performance evidence* were clustered under a provisional analytical category labeled "Assessment as Implementation Driver."

2.11.4 Phase 4: theme construction

Pattern clusters were analytically refined into higher-order themes that directly corresponded to the three study objectives:

1. Competency integration mechanisms.
2. Labor-market responsiveness.
3. Implementation strategies.

Theme construction was guided by:

- Internal coherence (consistency within themes).
- External distinction (clear separation across themes).
- Explanatory power (capacity to account for observed implementation behavior).

2.11.5 Phase 5: theme review and refinement

Themes were reviewed against:

- The complete dataset.
- National curriculum and policy provisions.
- Role-based confirmation between professors and principals.
- Disconfirming and minority cases.

Themes were retained only if they were:

- Evident across multiple data sources (KIIs and documents).
- Supported by both system-level and school-level actors.

- Aligned with explicit policy directives.

Thematic sufficiency was achieved at Interview 12. Interviews 13–15 did not generate new codes but elaborated existing themes, confirming analytical saturation.

2.11.6 Phase 6: interpretation and integration

Final themes were interpreted through:

- Constructivist learning theory.
- Assessment-for-learning research.
- Education policy implementation theory.

Themes were then integrated into:

- The Findings section using evidentiary interview quotations and policy clauses.
- The Discussion section through comparative and theoretical interpretation.
- The Policy Implications section as sequenced and feasible reform mechanisms.

2.12 Findings

The aim of this study was to examine and explore the competency-based curriculum in Taiwan. To that end, data were obtained on the curriculum guidelines, curriculum framework, educational policy from document reviews and KIIs. Finally, it was thematically categorized, interpreted, and discussed using a review or related literature. The study evidenced each theme from the three objectives with cross-role quotes (professors/principals) and corroborating policy clauses, and noted any counter-examples or role-based divergences. Thematic sufficiency was reached by interview 12; KIIs 13–15 elaborated existing codes without extending the codebook. Table 3 depicts the emergent themes at a glance.

2.13 Objective one: to explore the competencies integration mechanisms into Taiwan curriculum

2.13.1 Overview of competency integration process

Taiwan's competency mapping is driven by MOE-led co-design that moves from high-level profiles to subject classrooms. Key informants explained that the Ministry aligned with OECD frameworks and then issued both 'general' and 'subject-specific' guidelines so schools interpret competencies consistently. Several respondents stressed the need for "harmonization of competencies so that everyone is on the right track," reflecting repeated clarification meetings and dissemination of worked guidance. Implication: begin with a small, authoritative national competency taxonomy and pair each competency with subject-level guidance and an exemplar task/rubric during roll-out to lower planning costs and stabilize quality.

The Ministry of Education of the Republic of China is in charge of the education of the country along with the National Academy of Educational Research. In the new competency-based curriculum of Taiwan, the country carried out policy borrow in 2004 from the OECD and contextualized the competency adoption as per KIIs.

As the key informants delineated, competency identification was based on the global trends and contextual issues acquired from the findings of the needs assessment then competencies were integrated in the different subjects/interdisciplinary and cross

disciplinary were made then Review Committee checked if the guidelines and frameworks are in line with the MOE Curriculum Policy (competencies). To find out if the competencies are achieved, KPIs were created. The Curriculum Review Committee had to also make sure subject specific guidelines and general guidelines.

Apart from the different subjects were competencies were integrated, competencies had been incorporated in teacher training practices. In the initial stage, there the committee first came up with the conceptualization of competencies so that everyone is on the right track.

> *During the initial meetings and discussions, the had been a lot of contentions on the right translation and nomenclature of "competency" to Chinese. For the competency identification, we used the DeSeCo (definition and selection of competencies by OECD), needs assessment findings and the generic competencies..KIIs.*

2.14 Stakeholder engagement

Stakeholder engagement has been instrumental in improving educational outcomes in Taiwan. For instance, the 12-Year Basic Education Curriculum Guidelines, implemented in 2014, was the result of extensive consultations with educators, scholars, and parents [41]. The Ministry of Education identified the key stakeholders to the process such as educators, scholars, curriculum specialists, teachers, parents, student representatives, community, Parent-teacher associations, professors, and the other interest groups such as the industry personnel.

The KIIs experts also elucidated that public consultations continued more than a year to listen to the public to create inclusive environment where everyone feels that his/her voice is heard.

> *Continuous public hearings were conducted to identify the needs of Taiwanese people and what kind of subjects needs to be included in the curriculum. Public dialogue was carried out and even online platforms were created to increase the transparency. Regular announcements were also made. All suggestions and opinions were recorded…KIIs.*

A respondent recalls "one of the most interesting areas that raised debate was the content because we had to develop a way to measure the performance of skills and knowledge rather the traditional approach using a contextualized model".

Furthermore, Taiwan adopted the bottom-up approach which has invigorated its education system [38]. Involving local communities and parents in education decisions has created a sense of ownership and responsibility, leading to improved school outcomes and stronger community support for schools. Taiwan's education system is highly decentralized, with significant decision-making authority delegated to local governments and schools. This decentralization allows educational institutions to tailor their programs and policies to meet the specific needs of their students and communities.

> *This was a grassroot approach were everything started from the bottom. It was a highly decentralized activity that everyone had the opportunity to participate in freely and offer his/her contribution to task. All opinions were systematically documented and later analyzed to ensure that the curriculum framework reflected the collective needs and aspirations of Taiwanese society…KIIs.*

According to Ministry of Education [40], National Academy for Educational Research (NAER) in Taiwan participates in the review and revision of Taiwan's national curriculum guidelines. This involves collecting input from various stakeholders, conducting research, and making recommendations for updates to the curriculum to reflect changing educational needs and societal developments [48]. NAER also plays important role in studying current educational trends, pedagogical best practices, and the evolving needs of the education system. NAER collaborates with educators, experts, and other stakeholders to design, revise, and innovate curricula for Taiwan's schools. A key informant noted:

> *NAER helped the acquisition and retrieval of all data related to education from its database. The Committee provide the blueprint and research findings. NAER contributions have helped ensure that Taiwan's competency-based curriculum is not only theoretically sound but also practically viable, ultimately fostering an education system that is responsive to the demands of a rapidly changing global landscape.*

2.15 Objective two: to find out extent to the new curriculum responds to labor markets demands of Taiwan

The imperativeness to integrate employability into the curriculum is underscored by factors such as the gap in skills among graduates, the rapidly changing global job market, disparities in the labor market, political influences, and the priorities of students [9, 22]. According to [47] securing employment has posed difficulties for young adults in the recent past.

In this case, the case of curriculum design and development of Taiwan, the curriculum review committee deeply deemed the tailoring of curriculum competencies into the labor market demands in order to increase the chances of employability of students. The participants of the study also pinpointed that during the curriculum design and development, industries were invited to address their concerns and needs at the market.

> *The curriculum review committee did not only comprise of teachers, principals, students, professors, scholars, researchers, parents, local govt officials and MoE but also industries in order to hear their voices and discover the needs of the market. This helped us tailor competencies in an emerging and fast changing global and local market.KIIs.*

In consistent with this, the [42] document "Education in Taiwan" elicited this information and stated that the program comprises a three-month educational phase and a subsequent three-month internship on a rotating basis. Participants have the opportunity to gain practical experience through internships at companies and institutes certified by the Ministry of Education. During these internships, they receive allowances, apply their acquired knowledge in a workplace setting, and, through a MOE project, can potentially pursue their studies at tech universities while advancing their career goals. This initiative, involving a three-year training collaboration, has proven beneficial for partnering businesses such as Panasonic, Walsin Technology Corporation, TECO Electric & Machinery Co., Gogoro, Hi-Lai Foods Co., Din Tai Fung, and Mentor Hair, enabling them to find the skilled talent they require.

"Initially designed to nurture engineering talent, the program has expanded and now includes seven disciplines: business management, food and beverage management, automobiles, electrical engineering, mechatronics engineering, cosmetology, and information. Electrical engineering in particular will be an area of focus to reflect industries' evolving needs" (Education in Taiwan, [42]).

Likewise, under the Practical Technical Programs and Cooperative Education Classes [42], emphasize hands-on skills and preparation for future employment. Students undergo annual training in these programs, acquiring skill sets tailored to actual employment needs. Essentially, each year of training focuses on equipping students with skills specific to a particular area. Cooperative education classes aim to prepare students for diverse industries. Through collaborations with businesses, schools can arrange various forms of internships, such as "rotating internships" or "ladder internships," approved by authorities.

"This curriculum revision not only follows strictly the educational goals specified in the Constitution, taking into account social changes, globalization trends, and the future demand for talent, to maximize their talent, and help them develop lifelong learning abilities, social compassion, and an international outlook" [41].

This was also supported by the KIIs that depicted the series public meetings and hearings from the industry personnel had contributed a lot to them on the needs of the market and curriculum the required competencies to vet for the industry needs. A key informant mentioned:

> *Public hearings had been ongoing for a long time to get evidence-based insightful options. In terms of labor market demands and employability, I think the active participation of industry personnel helped us a lot to realize the specific skills and knowledge industries need. We were in collaboration with industry stakeholders. This collaboration ensured that the curriculum is aligned with current industry standards and practices. Employers provided inputs on the specific skills and competencies they seek in potential employ. So, we considered the evolving needs of the job market and ensuring that students are equipped with the competencies.*

Interfaces with the labor market are structured and cyclical rather than ad hoc. Respondents described public hearings and advisory groups used to surface evolving skills needs, followed by program adjustments e.g., technical tracks "initially designed to nurture engineering talent" that were later updated to reflect changing industry profiles. Work-based learning functions as the bridge: Practical/Cooperative education offers laddered pathways (job shadowing and short placements; supervised internships). This had the implication of institutionalizing a quarterly advisory loop (industry–HEIs–schools) that directly maintains a change-log for curriculum/assessment, while starting with low-risk placements and scaling as supervision capacity grows.

Despite this, some very few respondents have reiterated that strong emphasis have not been given on the labor market demands of Taiwan and the competency-based curriculum adoption was a policy-borrow from the OECD and it was merely an admiration of the initiative that most of the developed countries have adopted this curriculum, Taiwan should also introduce.

> *I cannot say that Taiwan has given much attention to the labor market demands. In our efforts to revamp the education of Taiwan and prepare students for the 21st*

century, we have just made policy borrow from the OECD and put all our efforts to contextualize by looking at the global trend. In terms of Taiwan General Curriculum Guidelines, we discussed what kind of subjects needed to be included in the national curriculum and school curriculum, learning areas, required courses, number of hours, subject specific guidelines and school curriculum issues…KII.

Similarly, the technical and vocational education play significant role in the meeting the labor market demands and future employability of youth in Taiwan. According to the [42] to bridge the gap between theory and application of knowledge, there are two important initiatives "Youth Employment Pilot Program" and Youth Experiential Learning Program". These initiatives motivate graduates from senior secondary schools to devise their personalized experiential learning plan spanning 2–3 years.

According to [42] document, the "Industrial Talent Pilot Program" encourages young individuals to engage in vocational training within promising industries, including digital information, electronics, and electrical engineering, offering a maximum subsidy of $100,000. Both this program and pre-employment training initiatives led by the Ministry of Labor provide incentive payments of $3,000 per month for general courses and $8,000 per month for courses in national core industries, construction, or care services, for up to 12 months. Additionally, the "Youth's Employment Ultimate Program" incorporates on-the-job training opportunities from companies in the "hire first, train later" format, subsidizing employers with $12,000 per month for training guidance.

2.16 Objective three: to explore the various strategies for the implementation of Taiwan CBC

According to [30], the concern for curriculum implementation began in 1980s. Many educational researchers have different views on the major factors that affect the implementation of curriculum and the determinants of failure. Fullan M [21]believes that the failure of educational reforms is due to the lack of understanding of school culture. In other words, there has been a renewed push for educational reform in policy circles and among various ideologies. However, the implementation of these reforms has remained challenging, and repeated reforms are a hallmark of the past few decades. Kinniburgh LH [35] posits that implementation of educational change is brought about the teachers' moral and emotional considerations. Fullan M [21] reiterates that most of the curriculum projects intended for the implementation of new curriculum fail because of curriculum developers do not give adequate consideration to school organization. In the case of Taiwan, the respondents revealed that a bottom-up approach was employed during the curriculum design and development and this eased the implementation of the curriculum. On this question, the following themes emerged: grassroot approach to curriculum implementation (school curriculum and MoE mandated curriculum), systemic approach to professional development for teachers, authentic assessment, legal frameworks (directions, acts, regulations).

2.17 Grassroot approach

Most of the respondents stated that the development of competency-oriented curriculum of Taiwan was a well-planned, inclusive bottom-up approach. The respondents also revealed that before the implementation, during the development, the community was well informed about the change of the curriculum since continuous public hearings,

online platforms and public discussions were held across the country for years. According to the Ministry the curriculum revision involved the active participation of teachers. Furthermore, the Ministry of Education (MOE) "utilized public websites and online forums to seek input from teachers, parents, and the broader public" [42]. The committee members incorporated this feedback into the entire curriculum revision process.

> *Before the implementation of the curriculum, the public was well aware of the new curriculum; they were updated before the development of the curriculum. It was a grassroot approach rather that bureaucratic. Community was well informed about the new curriculum innovations. This is what every country should do in order to reach its milestones towards a competitive curriculum. On the other hand, the key players of the curriculum development such as students, teachers, professors, consultants, MoE, school principals, parents, civil society organizations, non-governmental organizations, directors, community members and other stakeholders played significant role during the development and implementation stages of the curriculum.*

On the other hand, some of the respondents posited that there were few concerns from the parents towards the new 12-Year Curriculum Guidelines. A key informant revealed:

> *Many of the parents expressed concerns in the in the beginning since they were not well aware of the goals and processes of the new curriculum guidelines. Due to continuous communication about the updated curriculum, parents are becoming more convinced that the Curriculum-Based Competency (CBC) aims to develop 21st-century skills, nurture individual talents, and encourage lifelong learning. This is accomplished through an interdisciplinary, innovative, and adaptable approach tailored to local needs.*

The key informants also elicited that the previous experience on the adoption competency-based curriculum in 2000 in Taiwan and the new trends of the OECD, UNESCO and EU helped them conceptualize and contextualize the key competencies required for the 21st century.

2.18 School curriculum

According to the [41], the guidelines include both Ministry-mandated and school-based curricula. The 12-Year Curriculum Guidelines are designed to increase school autonomy and actively involve a variety of stakeholders, including teachers, administrators, parents, and NGOs. Granting increased autonomy, schools were anticipated to spearhead the creation of curriculum at the school level. This involved active participation from all members of the school community, such as teachers, parents, teacher-educators, and resource persons [10]. However, similar to the obstacles encountered during the 9-Year curriculum reform, these guidelines have encountered some resistance. Similarly, the 12-Year Curriculum Guidelines necessitate schools to formulate individualized alternative curricula in addition to adhering to the newly mandated curriculum by the Ministry of Education. The school-based curriculum is expected to be created and presented by each school, emphasizing the institution's educational vision and supporting the personalized development of students based on their abilities [41]. The document also states that the school curriculum is "designed and offered by each school to highlight

the school's vision of education and facilitate students' development according to their aptitudes".

Similarly, the [41] issued a directive for curriculum implementation that contains eight major items. '(1) curriculum development; (2) teaching implementation; (3) learning assessment and application; (4) teaching resources; (5) teacher professional development; (6) administrative support; (7) participation of parents and nongovernmental organizations; and (8) supplementary provisions' [41].

According to [10] "These changes aimed to allow schools and teachers professional autonomy in school-based curriculum development in order to build students' fundamental competencies in various categories for modern society in the 21 st century."

According to [13], the school-based curriculum provides autonomy to schools by including both elective and required courses and alternative learning that increase the relevance of the curriculum and contextual needs.

> *School-based curricula encompass both mandatory and elective courses designed by individual schools, along with alternative or group learning periods tailored to students' specific needs. Depending on the level of schooling; elementary, junior high, or senior high the number of weekly sessions devoted to alternative curricula can range from two to seven, with grades 3–9 typically having more sessions. Moreover, each of the four senior high school tracks (as defined in the Senior High School Education Act) has unique requirements regarding how much of the curriculum schools can develop on their own versus what is mandated by the Ministry of Education. Specialized and comprehensive high schools, in particular, enjoy considerable autonomy, allowing them to classify more than half of their required credits as alternative curriculum.*

Since the 1990 s, Taiwan's education system has experienced a transition towards greater decentralization and active participation. Previously, the emphasis was on sorting students for university placement. Nevertheless, entering the 21 st century prompted a shift in priorities towards nurturing future talent, leading to the transformation of the system into one that revolves around students and emphasizes lifelong learning [11].

The respondents also pointed out that school the alternative school curriculum provided them a high degree of autonomy to incorporate local context needs and culture into the curriculum. They also showed that they made significant strides in the development of the school curriculum by developing comprehensive plans.

> *We devised a solid curriculum development and implementation plan. On one hand we had to implement the MOE mandated curriculum while on the other hand we had to compile all our resources to develop a school-based curriculum that reflects on the needs and interest of our students and community. We adopted transformational leadership to face the new change and made sure everyone was on board. Consensus was reached on the vision of the school. We had to arrange continuous workshops for teachers in order to face the new transformation. I remember when we use the ORID (Objective, reflective, interpretive and decisional) for structuring our debates and conversations.*

Another principal also noted that they divided the teachers into clusters and developed mapping school vision, philosophy, the needs and interests of students, diversity and culture integration into the curriculum.

> *Fortunately, my school is a pioneering school that participated in the pilot programs of the Ministry of Education. Therefore, we devised a comprehensive mapping plan to portray our school philosophy and vision based on the needs and interest of our students and community. We divided the teachers into clusters by employing distributive leadership where every teacher was engaged in the activity. Teachers, students and parents were also engaged in the curriculum development process. The new curriculum leaves a room of one-third for the schools to develop and implement. Therefore, the most interesting thing was integrating the competencies in the subjects and learning areas of the school curriculum.*

This was also stated by the Ministry of Education [40] 'Rather than imposing specific directives and force-feeding knowledge, the approach encourages educators to devise their own curricula based on the needs of students and in line with the traits of the schools they serve".

On the aspect of support for implementation, the respondents (professors and scholars from NAER) also revealed that schools were given continuous support on the development and implementation of the school curriculum.

> *To make sure that schools implementation of the new curriculum, professors and scholars regularly visit schools to support them the continuous professional development courses for their teachers in order to integrate the core competencies in their instructional strategies and assessment approaches. This was really a challenge to many teachers so we had to strive to make it easy for them to comprehend the application of the 21 st century competencies in their pedagogies. We also created learning communities in schools in order convince teachers to act as curriculum innovators..KIIs.*

The respondents also asserted that most workshops provided to schools focused on "incorporating competency/competencies into different subjects and creating interdisciplinary activities by also considering the needs and interests of the students and the vision of the school".

> *In Taiwan, parents consider education as one of the most important investments; therefore, parents were engaged in the school curriculum development and implementation. They actively participate in school meetings, provide feedback on educational policies, and collaborate with teachers to enhance learning experiences. This high level of parental involvement fosters a strong academic culture, ensuring that students receive the necessary support both at school and at home."KIIs.*

2.19 MoE mandated curriculum

According to [41], the government designs this curriculum to enhance students' fundamental learning skills and establish a foundational framework based on their individual aptitudes. In elementary and junior high school, the curriculum encompasses 'domain-specific courses' aimed at fostering students' fundamental knowledge and skills, promoting well-balanced development across all learning areas. The upper secondary

school curriculum, mandated by the Ministry of Education, consists of general subjects essential for students to build a foundational understanding across different domains. Additionally, it includes vocational subjects and practical courses tailored to their professional growth and individual aptitudes [41].

> *This MoE mandated curriculum guidelines refer to the national-level guidelines and standards set by the Ministry of Education. It outlines the core subjects, learning areas, and essential content that all schools across the country are required to follow. It provides a standardized framework to ensure a baseline level of education. The MOE mandated curriculum revisions are based on educational research, societal needs, and global trends. Updates to the curriculum took much time and involve a comprehensive review process and thorough stakeholder engagement. KIIs.*

The Eighth National Education Conference in 2010 reached a consensus that, drawing from the educational development experiences of advanced nations and guided by principles such as broad accessibility, voluntary participation, quality assurance, and social justice, the Ministry of Education (MOE) should take the lead in implementing a 12-year basic education program. In his 2011 New Year's address, President Ma Ying-jeou pledged to carry out this initiative. Later that year, in September, the Executive Yuan approved the 12-Year Basic Education Implementation Plan, scheduling its full rollout for August 1, 2014. The National Academy for Educational Research, along with the Department of Technological and Vocational Education under the MOE, was tasked with developing the curriculum for the program [41].

2.20 Systemic approach to teacher professional development

Ongoing professional development (OPD) enables teachers to acquire the essential knowledge and skills required for the successful implementation of a new curriculum [54]. While it is well acknowledged that any effective educational system must include continual professional development [3], it is especially crucial during curriculum revision [7].

Many government- initiated training programs and workshops are carried out to urge teachers to participate in professional development and to take steps in promoting twenty-first century competencies' learning as presented in the 12-year curriculum [10]. In many occasions, the skills and fundamental competencies relevant to the twenty-first century are not systematically incorporated or adequately interpreted in national curricula, school curricula, and classroom activities [20, 27, 60, 60]. Consequently, there is a deficiency in adequately preparing students with these competencies [23]. The implementation of twenty-first-century teaching and learning necessitates substantial changes not only to the curriculum, instruction, and assessments but also an increased focus on recognizing the pivotal and active role of teachers in the implementation.

The KIIs articulated that professional development programs were put in place to equip teachers with the core competencies and how they would align it with their instructional strategies. The respondents further noted that government funded many professional development programs, workshops, seminars in order to train teachers on the conceptualization and contextualization of core competencies that students need to develop.

> *As part of the implementation strategy, the government provided funding for rigorous professional development programs. The good thing was that the way of undertaking the required professional development was even research based. We adopted systemic approach by conducting study on the pedagogical needs of teachers for implementing competency-based curriculum. Based on the finding of that study, we reconstructed the teacher professional development mechanisms. While certain competencies are straightforward to articulate and incorporate into current school curricula, many involve interactive, cross-cutting skills that pose a considerable challenge in terms of integrating them into curriculum policies and classroom instructional activities.*

The respondents further revealed that a significant number of teachers engaged in professional development endeavors linked to the educational reform, participating in activities such as workshops, collaborative lesson planning, teaching observations, and involvement in professional learning communities at various points in time. An informant mentioned:

> *Municipalities, central governments, and schools were also providing fund for the professional development for teachers. I can say 90% of the teachers underwent P.Ds on competency-based curriculum and parents heard about it. To make sure the effectiveness of the P.D.s, key performance indicators were set based on the number of workshops, meetings, seminars teachers attended. There were also success in the pilot schools in the initial stages. In Taiwan, parents care about education a lot; this was also a driving force that drove the momentum forefront. KIIs.*

The respondents also pointed out that they had devised an implementation plan to adopt for the new curriculum by training teachers to adapt the competency-based curriculum and innovative pedagogies in the classroom. The principals further noted 'they employed transformational leadership to engage parents, teachers and students to create a conducive environment for the new curricula'.

Key informants also noted a paradigm shift in teaching methods, with educators adopting innovative pedagogies that move beyond conventional lectures. One respondent stated 'our schools have witnessed a revolution in teaching practices. Teachers are now engaging students with project-based learning, where lessons are not confined to textbooks but are dynamic, real-world problem-solving experiences. This approach empowers both teachers and students to explore subjects deeply and creatively'.

The emphasis on inquiry-based methods and fostering self-directed learning was also prominent. A respondent elaborated:

> *Inquiry teaching encourages students to ask questions and seek answers independently, which naturally promotes self-directed learning. This change is not only refreshing but essential for developing critical thinkers. Teachers have embraced this method, transforming classrooms into interactive laboratories of ideas.*

The survey also revealed that Taiwan had experienced many challenges during the implementation of the competency-oriented education. One participant recalls:

> *The implementation of Taiwan's Competency-Based Curriculum (CBC) faces several challenges, primarily stemming from the centralized, top-down approach to gover-*

nance that has traditionally characterized the country's education system. Despite the 12-Year Curriculum Guidelines aiming to promote school autonomy and stakeholder involvement, some resistance has emerged, particularly from teachers who feel inadequately engaged in the reform process. Teachers have expressed concerns that decisions were primarily made by experts, with their input being insufficiently considered.

2.21 Professional and networked learning communities

Professional Learning Communities (PLCs) and Networked Learning Communities (NLCs) became central to fostering collaboration. A respondent described their transformative impact:

Before CBC, teachers worked in silos. Now, our PLCs meet weekly to design cross-subject projects. For example, science and language teachers co-created a 'Climate Change Storytelling' unit. This not only improved pedagogy but also built trust among staff. The Ministry's online portal connects rural and urban teachers. Last year, our NLC shared resources for inquiry-based math lessons. One teacher in Taitung adapted our materials to include Indigenous weaving patterns, showing how networked learning fosters localized innovation.

Collaborative approaches have become integral to teacher development. One respondent highlighted.

The formation of professional learning communities has been a game-changer. Educators now collaborate regularly, sharing best practices and resources across networked learning communities. This cooperative teaching model ensures that innovation is not isolated to individual classrooms but becomes a shared responsibility for systemic improvement. In my school, in some cases, two teachers now co-lead classes, one focuses on content delivery, the other on individualized support. This approach reduced student disengagement, especially in mixed-ability groups.

2.22 Authentic assessment

Another key theme was the shift toward authentic assessment methods, which aim to capture the full spectrum of student learning beyond traditional exams. The sub-themes here include: portfolios, student profiles,, checklists, reflective journals, peer assessments, rubrics, observation schedules, anecdotal records, high-stake exams and a focus towards formative assessment.

Educators have increasingly adopted portfolios and student profiles as central assessment tools. A respondent stated.

Portfolios and student profiles provide us with a holistic view of each student's progress. Unlike conventional exams, these tools allow us to see the evolution of a student's skills and competencies over time. This continuous assessment model is transformative; it documents learning journeys in a way that is both meaningful and reflective of real-life abilities. Students curate portfolios with essays, art, and reflection journals. For instance, a shy student used her portfolio to showcase leadership in a community garden project; something exams never captured.

There is also an emerging need to reform the structure of assessments to align with modern pedagogical goals. As one educator noted,

> *Reformatting our assessment methods has required us to rethink how we evaluate learning. We are reconceptualizing classroom activities so that they serve both as learning experiences and as assessments. This dual purpose not only motivates students but also provides a richer data set for evaluating their true capabilities. Through this, we create student profiles. Each student's profile includes peer feedback, self-assessments, and teacher notes. One profile revealed a student's aptitude for conflict resolution, leading us to assign her as a peer mediator.*

The traditional high-stakes exam model is undergoing significant reconstruction. A respondent explained,

> *High-stake testing has long been a source of stress and often fails to capture the nuanced skills of our students. By re-constructing these tests to include diverse assessment elements, we are shifting the focus from rote memorization to genuine competency and critical thinking. I know a student who used to panic before tests. Now, his final project, a robotics prototype, counts for 50% of his grade. He's more motivated and creative.*

2.23 Legal framework: directions, acts, and regulations

The third theme centers on the pivotal role of legal and regulatory frameworks in underpinning the CBC reforms. This theme encompasses several sub-themes such as directions, acts, policy guides and regulations. A key informant noted that "the directions issued by our Ministry of Education have been crucial. They outline the vision and practical steps for CBC implementation, offering clarity and a sense of purpose that has galvanized the entire education community."

3 Discussion

The findings identify three linked mechanisms behind Taiwan's CBC uptake: (1) coherent competency architecture paired with worked exemplars and school-level planning; (2) labor-market engagement via advisory input and assessable project work; and (3) implementation supports assessment literacy, moderation, protected collaboration time, and phased piloting. These mechanisms are consistent with international evidence that evaluation and assessment systems drive classroom practice when they signal formative evidence and quality criteria [50]. and with assessment-for-learning research that shows analytic rubrics and performance tasks shape instruction [2, 25]. The emphasis on school-embedded professional learning aligns with syntheses showing ongoing, collaborative PD outperforms one-off workshops [15].

Comparatively, African CBC reforms articulate similar aims but repeatedly confront assessment misalignment and limited collaboration time. Kenya's BECF specifies core competencies and continuous assessment yet faces teacher workload/time pressures [34] Rwanda's competence-based framework is coherent but still builds assessment literacy and exemplars [56]; Ghana's Standards-Based Curriculum foregrounds inquiry and AfL while calling for stronger moderation and task banks [45, 45]. South Africa's curriculum trajectory cautions that heavy documentation without calibrated assessment can decouple policy from practice [31]. Against this backdrop, data add how coherence was

operationalized in Taiwan through pairing autonomy with exemplars, routine moderation, and time-tabled PLCs clarifying the practical levers that comparable systems can adopt.

3.1 Theoretical implications

CBC often rests on constructivist assumptions [17, 61] yet translating "learning by doing" into system routines is under-specified. This analysis contributes a mechanism-level account: (i) competency architecture becomes actionable when exemplar artefacts (task banks, rubrics, student-work anchors) mediate teacher sense-making; (ii) assessment moderation functions as the social practice that stabilizes interpretations of competency evidence; and (iii) collaboration time is the enabling resource that turns guidance into enacted curriculum. For reflexive thematic analysis, the themes illustrate how researcher-generated interpretation can uncover system mechanisms rather than only catalog experiences [6].

3.2 Practical and policy implications for African systems

Given resource constraints and existing exam regimes, the study proposes sequenced, feasible steps:

Assessment alignment first Carrying out needs assessment research first. Then, establish moderation routines (monthly/termly) with brief exemplar packs (3–5 tasks/rubrics per learning area) to anchor classroom judgement before scaling large task banks.

Protect collaboration time Timetable PLCs/NLCs (e.g., 2–3 h per fortnight) focused on co-designing/trying out tasks and calibrating rubrics; short, repeated cycles outperform one-off PD.

Advisory inputs for relevance Where internships are infeasible, use school–industry project briefs and simulations with assessable criteria; formalize lightweight advisory panels that meet during curriculum review windows.

Phased pilots with feedback loops Pilot in diverse sites (urban/rural), collect artifacts and moderation notes, and circulate worked examples to early adopters before national scale; this addresses workload and raises assessment credibility.

Contextualize globally borrowed models Adapt competency language and assessment to local languages/subjects and equity constraints; treat policy borrowing as design inspiration, not wholesale import.

3.3 Contribution and novelty

Most CBC papers either (a) summarize policy texts or (b) present single-classroom vignettes. The contribution of this study is to triangulate policy documents with practitioner interviews to specify implementation mechanisms and transfer conditions. The study showed that autonomy, exemplars, moderation, collaboration time, advisory input and phased pilots are the minimum viable bundles that made CBC actionable in Taiwan and most plausibly transferable under African constraints.

3.4 Limitations

This qualitative study offers an in-depth account of *how* Taiwan's competency-based curriculum (CBC) was coordinated and which elements may be transferable to resource-constrained systems. Several limitations bound interpretation. First, the sample (10

curriculum scholars/experts; 5 principals) was purposively selected for information power, prioritizing role diversity over numerical representativeness; findings are therefore analytically transferable rather than statistically generalizable. Second, policy documents were analyzed as authoritative statements of intent; while triangulated them with practitioner accounts, the study cannot claim full coverage of all school contexts or implementation episodes. Third, transferability to African systems depends on contextual conditions (e.g., assessment regimes, PLC time, employer ecosystems). Finally, the study did not quantify prevalence or outcomes; future research could pair qualitative mechanism-tracing with mixed-methods designs to estimate breadth and impact under real-world constraints.

4 Conclusions

This study indicates that aspects of Taiwan's CBC coherent core-competency architecture, school-level curriculum planning anchored by worked exemplars, assessment authenticity with moderation, scheduled and organized teacher collaboration, and structured industry advisory inputs were associated with classroom-level uptake when implemented together. These findings should be read as mechanism-focused, context-bound insights, not general claims of system effectiveness. For African systems seeking adaptation, the most feasible entry points are (a) curating exemplar task/rubrics with moderation routines, (b) protecting collaboration time for PLCs/NLCs, and (c) establishing lightweight advisory structures to shape assessable projects, even where internships are not yet viable. The study concludes that phased pilots with feedback loops to build locally valid exemplars before scale, and mixed-methods follow-ups to assess implementation breadth and outcomes would push the momentum of curriculum reforms in Africa forefront.

Acknowledgements
The researcher acknowledges the Ministry of Foreign Affairs of Taiwan for granting the fellowship program. I also thank for the high-level supervision and resources provided by National Taiwan Normal University during the fellowship period.

Author contributions
The author is the sole contributor to the drafting, writing up and all the other stages of this paper.

Data availability
The data that support the findings of this study are available from the corresponding author upon reasonable request. Due to privacy and ethical considerations involving the participants, the data are not publicly available.

Declarations

Ethics approval and consent to participate
The manuscript has not been submitted to any other journal. The study is conducted in accordance with the American Psychological Association's Research Ethics Code. The ethical review was carried out to ensure that the research complied with national research standards and ethical principles regarding studies involving human participants. The study was found to adhere to appropriate ethical guidelines, and approval was granted by the Ministry of Education and Science of Somaliland Research Ethics Commission with the following details: Approval Number: REC/MOES/0748/2022.

Consent for publication
Informed consent was obtained for all participants to their participation in the study. Additionally, participants were reminded at the start of the study that they had the right to withdraw from the study at any time.

Informed consent
The author has obtained informed consent from all participants.

Competing interests
The authors declare no competing interests.

Received: 4 June 2025 / Accepted: 1 January 2026
Published online: 12 January 2026

References

1. African Union. (2016). Continental education strategy for Africa 2016–2025 (CESA 16–25). https://ecosocc.au.int/sites/default/files/files/2021-09/continental-strategy-education-africa-english.pdf
2. Black P, Wiliam D. Assessment and classroom learning. Assess Educ. 1998;5(1):7–74. https://doi.org/10.1080/0969595980050102.
3. Borko H. Professional development and teacher learning: mapping the terrain. Educ Res. 2004;33(8):3–15. https://doi.org/10.3102/0013189X033008003.
4. Bowen GA. Document analysis as a qualitative research method. Qual Res J. 2009;9(2):27–40. https://doi.org/10.3316/QRJ0902027.
5. Braun V, Clarke V. Using thematic analysis in psychology. Qual Res Psychol. 2006;3(2):77–101. https://doi.org/10.1191/1478088706qp063oa.
6. Braun V, Clarke V. Reflecting on reflexive thematic analysis. Qual Res Sport Exerc Health. 2019;11(4):589–97. https://doi.org/10.1080/2159676X.2019.1628806.
7. Broadhead P. Curriculum change in norway: thematic approaches, active learning and pupil cooperation—from curriculum design to classroom implementation. Scand J Educ Res. 2001;45(1):19–36. https://doi.org/10.1080/00313830020023375.
8. Bruner JS. The act of discovery. Harv Educ Rev. 1961;31(1):21–32.
9. Cashian P, Clarke J, Richardson M. (2015). Perspectives on: employability—Is it time to move the employability debate on? Chartered association of Business Schools. https://microsites.bournemouth.ac.uk/flie/files/2015/06/Employability-Debate1.pdf
10. Chen H-LS, Huang H-Y. (2017). Advancing 21st century competencies in Taiwan. https://doi.org/10.21203/rs.3.rs-6819720/v1
11. Chen P, Yang C-L, Hung W-J. (2020). Exploring high-school readiness for change in Taiwan from a lens of policy design. https://doi.org/10.6925/SCJ.202009
12. Cheruiyot B. Challenges faced in the implementation of competency-based curriculum (CBC) in junior schools in Kenya. East Afr J Educ Stud. 2024;7(3):260–6. https://doi.org/10.37284/eajes.7.3.2098.
13. Coudenys B, Strohbach G, Tang T, Udabe R. (2022). On the path toward lifelong learning: An early analysis of Taiwan's 12-year basic education reform. In F. M. Reimers, U. Amaechi, A. Banerji, & M. Wang, editors, Education to build back better (pp. 75–98). Springer. https://doi.org/10.1007/978-3-030-93951-9_4
14. Creswell JW, Creswell JD. Research design: qualitative, quantitative, and mixed methods approaches. 5th ed. SAGE; 2018.
15. Darling-Hammond L, Hyler ME, Gardner M. (2017). Effective teacher professional development. Learning Policy Institute. https://learningpolicyinstitute.org/sites/default/files/product-files/Effective_Teacher_Professional_Development_REPORT.pdf
16. Department of Basic Education (South Africa). (2012–2018). Curriculum and assessment policy statements (CAPS). https://www.education.gov.za/Curriculum/CurriculumAssessmentPolicyStatements%28CAPS%29.aspx
17. Dewey J. Experience and education. Macmillan; 1938.
18. DuFour R. What is a professional learning community? Educational Leadersh. 2004;61(8):6–11. https://www.ascd.org/el/articles/what-is-a-professional-learning-community.
19. Education Fundamental Act Promulgated. Republic of China (Taiwan). 1999
20. Erstad O, Voogt J. (2018). The twenty-first century curriculum: Issues and challenges. In J. Voogt, G. Knezek, R. Christensen, & K.-W. Lai, editors, Second handbook of information technology in primary and secondary education (pp. 19–36). Springer. https://doi.org/10.1007/978-3-319-71054-9_1
21. Fullan M, Rincón-Gallardo S, Hargreaves A. Professional capital as accountability. Educ Policy Anal Archiv. 2015;23:15. https://doi.org/10.14507/epaa.v23.1998.
22. Gallagher SR. (2018). Educational credentials come of age: a survey on the use and value of educational credentials in hiring. Center for the Future of Higher Education & Talent Strategy, Northeastern University. https://cps.northeastern.edu/wp-content/uploads/2021/03/Educational_Credentials_Come_of_Age_2018.pdf
23. Goldman SR, Pellegrino JW. Research on learning and instruction. Policy Insight Behav Brain Sci. 2015;2(1):33–41. https://doi.org/10.1177/2372732215601866.
24. Guest G, Bunce L, Johnson L. How many interviews are enough? Field Method. 2006;18(1):59–82. https://doi.org/10.1177/1525822X05279903.
25. Gulikers JTM, Bastiaens TJ, Kirschner PA. A five-dimensional framework for authentic assessment. Educ Technol Res Dev. 2004;52:67–86. https://doi.org/10.1007/BF02504676.
26. Gulled YM. Paradigms for contextualizing competency-based curriculum in africa: inferences from the OECD countries. Educ Quart Rev. 2023;6(1). https://doi.org/10.31014/aior.1993.06.01.721.
27. Halász G, Michel A. Key competences in europe: Interpretation, policy formulation and implementation. Eur J Educ. 2011;46(3):289–306. https://doi.org/10.1111/j.1465-3435.2011.01491.x.
28. Haque MS. (2022). Inductive and/or deductive research designs. In Principles of social research methodology (pp. 59–71). Springer. https://doi.org/10.1007/978-981-19-5441-2_5
29. Hennink M, Kaiser BN. Sample sizes for saturation in qualitative research: a systematic review of empirical tests. Soc Sci Med. 2022;292:114523. https://doi.org/10.1016/j.socscimed.2021.114523.
30. Hunkins FP, Ornstein AC. Curriculum innovation and implementation. Educ Urban Soc. 1989;22(1):105–14. https://doi.org/10.1177/0013124589022001011.
31. Jansen JD. Curriculum reform in South Africa: a critical analysis of outcomes-based education. Camb J Educ. 1998;28(3):321–31. https://doi.org/10.1080/0305764980280305.
32. Kellaghan T, Greaney V. (2019). Public examinations examined. World Bank. https://openknowledge.worldbank.org/handle/10986/31797
33. Kenya National Examinations Council. (2021). Competency-based assessment framework for Early Years Education (CBAF-EYE). https://www.knec.ac.ke
34. Kenya Institute of Curriculum Development. (2017). Basic education curriculum framework. https://kicd.ac.ke/wp-content/uploads/2017/10/CURRICULUMFRAMEWORK.pdf

35. Kinniburgh LH. Breakthrough in education reform. Educ Forum. 2008;72(3):282–3. https://doi.org/10.1080/00131720802046149.
36. Lee R-L, Chen H-P, Liao Y-N. (2019). Curriculum guidelines observation report.
37. Lin T-B, Wang L-Y, Li J-Y, Chang C. Pursuing quality education: the lessons from the education reform in Taiwan. Asia Pac Educ Res. 2014;23(4):813–22. https://doi.org/10.1007/s40299-013-0135-4.
38. Lo WYW. (2014). Taiwan's higher education system in context. In University rankings (pp. 15–39). Springer. https://doi.org/10.1007/978-981-4560-35-1_2
39. Malterud K, Siersma VD, Guassora AD. Sample size in qualitative interview studies: guided by information power. Qual Health Res. 2016;26(13):1753–60. https://doi.org/10.1177/1049732315617444.
40. Ministry of Education. Education in Taiwan. 2021. https://stats.moe.gov.tw/files/ebook/Education_in_Taiwan/2021-2022_Education_in_Taiwan.pdf .
41. Ministry of Education, Republic of China (Taiwan). (2014). Curriculum guidelines of 12-year basic education: general guidelines https://www.naer.edu.tw/ezfiles/0/1000/img/52/129488083.pdf
42. Ministry of Education. (2023). 2023–2024 Education in Taiwan. https://www.studyintaiwan.org/download/rsl14wJ5ls3sdLd_yXdLBDJxL2xFTStpOW1qZlBsL1o2dkxEOHc9PQ.pdf
43. Mocanu C, Zamfir AM, Pirciog S. Matching curricula with labour market needs for higher education: state of art, obstacles and facilitating factors. Procedia Soc Behav Sci. 2014;149:602–6. https://doi.org/10.1016/j.sbspro.2014.08.234.
44. Morgan H. Conducting a qualitative document analysis. Qual Rep. 2022. https://doi.org/10.46743/2160-3715/2022.5044.
45. NaCCA (National Council for Curriculum and Assessment). (2019). Standards-based curriculum (Basic School). https://nacca.gov.gh/learning-areas-subjects/new-standards-based-curriculum-2019/
46. National Research Council. Education for life and work: developing transferable knowledge and skills in the 21st century. National Academies; 2012. https://doi.org/10.17226/13398.
47. Nikunen M. Labour market demands, employability and authenticity. J Appl Youth Stud. 2021;4(3):205–20. https://doi.org/10.1007/s43151-021-00049-1.
48. OECD. Synergies for better learning: an international perspective on evaluation and assessment. OECD Publishing. 2013. https://doi.org/10.1787/9789264190658-en.
49. OECD. (2019). PISA 2018 results (I): what students know and can do. OECD Publishing. https://doi.org/10.1787/5f07c754-en
50. OECD. (2023). Education policy outlook 2023. OECD Publishing. (incomplete—add DOI/URL).
51. Pan H-L, Yu C. Educational reforms with their impacts on school effectiveness and school improvement in Taiwan, R.O.C. Sch Eff School Improv. 1999;10(1):72–85. https://doi.org/10.1076/sesi.10.1.72.3516.
52. Piaget J. The stages of the intellectual development of the child. Bulletin of the Menninger Clinic. 1962;26(3):120-8.
53. Porcenaluk S, O'Neachtain A, Connolly C. Reimagining a framework for teachers' continuous professional development during curriculum reform. Ir Educ Stud. 2023;42(4):931–48. https://doi.org/10.1080/03323315.2023.2250765.
54. Reimers FM, Amaechi U, Banerji A, Wang M, editors. (2022). Education to build back better. Springer. https://doi.org/10.1007/978-3-030-93951-9
55. Rwanda Education Board. (2015). Competence-based curriculum: curriculum framework. https://cur.ac.rw/mis/main/library/documents/book_file/digital-63f49bc5eeafa8.81233706.pdf
56. Rwanda Education Board. (2020). Teacher Training Colleges (TTC) curriculum framework. https://elearning.reb.rw/pluginfile.php/20276/mod_folder/content/0/TTC%20Curriculum%20Framework%202020/TTC%20CURRICULUM%20FRAMEWORK%202020.pdf
57. Sandelowski M. Whatever happened to qualitative description? Res Nurs Health. 2000;23(4):334–40.
58. Schleicher A, editor. (2012). Preparing teachers and developing school leaders for the 21st century. OECD Publishing. https://doi.org/10.1787/9789264174559-en
59. Timperley H, Wilson A, Barrar H, Fung I. (2007). Teacher professional learning and development: best evidence synthesis iteration (BES). New Zealand Ministry of Education. https://thehub.sia.govt.nz/assets/documents/42432_TPLandDBESentireWeb_0.pdf
60. Voogt J, Pareja Roblin N. A comparative analysis of international frameworks for 21st century competences: implications for National curriculum policies. J Curriculum Stud. 2012;44(3):299–321. https://doi.org/10.1080/00220272.2012.668938.
61. Vygotsky LS. Mind in society: the development of higher psychological processes. Harvard University Press; 1978.
62. Wu J, Lee MC-L. The relationships between test performance and students' perceptions of learning motivation, test value, and test anxiety in the context of the English benchmark requirement for graduation in Taiwan's universities. Lang Test Asia. 2017;7(1):9. https://doi.org/10.1186/s40468-017-0041-4.

Publisher's Note

Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.