

Modelling the relationship between teaching methods, assessment methods and acquisition of 21st employability skills among university graduates

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Abstract

This study modelled the effect of teaching and assessment methods on the acquisition of 21st employability skills among 784 postgraduate and undergraduate students sampled from a public university, using the cross-sectional survey design. A self-administered questionnaire was used to collect data which was analyzed with Partial Least Square-Structural Equation Modelling (PLS-SEM). The study found that learner-centred pedagogy and summative assessment methods had a statistically significant relationship with employability skills. Furthermore, the learner-centred method significantly mediated the relationship between the teacher-centred method and employability skills; and summative assessment also significantly mediated the relationship between formative assessment and employability skills. It was recommended that assessment methods should shift away from long hours of sit-down examinations to a more practical progressive assessment with more scores and time to be able to equip graduates with employability skills.

Keywords

Learner-centred, teacher-centred pedagogy, formative assessment, summative assessment, 21st century, employability skills, university graduates

Introduction

The changing trends in the world of employment due to globalisation, population growth and competition on the job and commodity markets have made employability skills very important for researchers and educational institutions (Segbenya et al., 2021; Zainuddin et al., 2019). Work-readiness of higher education graduates is also a concern for governments, industries and graduate employers (Haugland et al., 2022; Mpho, 2018). Employers require labour market entrants, including university graduates, to possess both soft and technical employability skills (Botha and Botha, 2022; Zainuddin et al., 2019). Employability

skills are skills imparted to graduates to make them a productive workforce and desirable by employers (Zainuddin et al., 2019). These skills may include generic or basic, soft and technical employability skills (Priksht et al., 2019).

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The relevance of employability skills in the job market places key responsibilities on educational institutions that train graduates for the job market. It requires that higher education institutions align their curriculum of academic programmes to the demands in the labour market (Haugland et al., 2022; Zainuddin et al., 2019). One key precursor for educational institutions to impact graduates' employability skills in the 21st century can be the teaching pedagogy used to deliver academic curricula in the classroom (Mensah and Attah-Boison, 2015). Pedagogies for delivering curricula have implications for impacting employability skills (Schildkamp et al., 2020). The traditional teacher-centred approach, such as the lecture method and whole class discussions, have dominated the past due to the need to cover a large portion of the curriculum, prepare learners for examination, and introduce new knowledge or topic (Mensah and Attah-Boison, 2015). However, due to the shortcoming of the teacher-centred methods of making learners passive, the learner-centred method was introduced and is more recommended in recent times because it makes the learner active and the teacher a facilitator (Mensah and Attah-Boison, 2015). Thus, the use of small group discussions, field trips, work-based learning, problem-based learning, brainstorming and role-play as methods of delivering course content are more encouraged under the learner-centred approach (Aede et al., 2014).

Another important aspect of the academic curriculum, apart from the pedagogy of higher education institutions that have implications for acquiring 21st-century employability skills, is the assessment methods used to assign course grades (Mpho, 2018; Taale and Ngman-Wara, 2015). The formative or summative assessment could highlight the goal of the facilitation. It relates to whether facilitation is to pass an examination or impact 21st employability skills to learners. Assessment components and their marks allocation by facilitators could further validate the kind of employability to be impacted (Taale and Ngman-Wara, 2015). The importance attached to the course and the kind of employability skills to be acquired is influenced by marks allocations for assessment components (Andrade et al., 2015; Schildkamp et al., 2020). Thus, higher marks allocation for sit-down examination as compared to project work, group work or discussion and brainstorming only suggest that learners will learn for examination and could hardly acquire any practical 21st employability skills at the end of the programmes.

There are existing studies on employability, teaching pedagogy and assessment methods. For example, studies have highlighted the 21st employability skills relevant to the job market by employers, such as leadership, teamwork, communication, paying attention to detail, emotional intelligence, computer and technical literacy, entrepreneurial skills, intellectual resources and job-specific skills (Botha and Botha, 2022; Clarke, 2018; Gary, 2018; Haseeb, 2021;

Prikshat et al., 2019; Segbenya et al., 2021). The relevance of teaching pedagogy has also been emphasised in literature by (Aede et al., 2014; Haugland et al., 2022; Mpho, 2018; Taale and Ngman-Wara, 2015) for sterling academic performance among learners. Ozan and Kincal (2018), Zainuddin et al. (2019), Schildkamp et al. (2020), and Andrade et al. (2015) have also studied the relevance of assessment methods for students' academic performance and acquisition of employability skills.

Despite all these studies, Segbenya et al. (2021) and Zainuddin et al. (2019) still revealed that there is a gap between the skills acquired by university graduates and those required by employers suggesting further studies on how the mismatch can be curtailed. However, all the previous studies were conducted outside Ghana, creating a contextual gap. Those studies carried out in Ghana (Segbenya et al., 2021) also focused on employability skills or teaching pedagogy and assessment (Taale and Ngman-Wara, 2015), creating a conceptual gap. Thus, there is a paucity of literature on how higher education institutions can use teaching pedagogy and assessment methods to enhance the acquisition of 21st-century employability skills among tertiary graduates in order to bridge the gap. For this reason, this study sought to examine the effect of teaching pedagogy and assessment methods on the acquisition of 21st employability skills among university graduates. Thus, this study contributes to the literature on employability, teaching pedagogy and assessment methods in education. Thus, the multi-disciplinary contribution of this study in terms of education and business and building a linkage between academia and industry is highly expected.

Theoretical perspective

The job-matching theory serves as the theoretical framework for this study. Job matching theory focuses on ensuring that students acquire the necessary abilities to be motivated to carry out various duties in the workplace in the future (Jonck et al., 2017). According to Verccio (2016), the job matching theory by Barnard, Veldhuis, and Van Rooij posit that graduates' productivity, salaries, and future job applications will suffer if their skill set falls short of what employers need. Therefore, the skills that companies demand must be comparable to those that graduates of higher education institutions attain. It is a challenge to ensure graduates understand the value of generic competencies and how a lack of them could limit their employment possibilities in a competitive labour environment (Maher and Graves, 2008). The relevance of this theory for this study is that this study focuses on the employability skills that are required for employment and performance. Thus, both generic and technical employability skills are necessary for employment and performance on the job. Furthermore, this study uses the theory to examine how higher educational institutions can use teaching and assessment methods as

conduits for impacting 21st employability skills unto university graduates.

Conceptual review and hypothesis development

This section focuses on three dimensions. These are teaching methods, assessment methods and employability skills. Teaching methods are techniques and strategies teachers adopt to deliver their lessons and make learners succeed. The two traditional forms of teaching methods of concern to this study are teacher-centred and learner-centred methods. Assessment methods also relate to how students are graded for their academic performance through specific assessment activities assigned to learners by their facilitators. The two main forms of assessment methods or techniques considered in this study are formative and summative assessment.

Relationship between teacher-centred methodology and employability skills

Teacher-centred methods relate to teaching pedagogy, where the teacher takes a central role in the teaching and learning situation (Mensah and Attah-Boison, 2015). The teacher-centred approach is deployed for facilitation with the assumption that the teacher knows best and learners' needs are the same as well as learners learn the same way (Mpho, 2018). The teacher-centred method focuses on what is taught. The justification for using the teacher-centred method has been its ability to help facilitators cover a large portion of the curriculum to prepare learners for examination, introduce new knowledge and present knowledge when there is a lack of textbooks and other instructional materials (Mensah and Attah-Boison, 2015).

The method has been criticised for making learners passive in the teaching and learning situation, disregarding the learners' interests and abilities, and being unfavourable to weak learners (Aede et al., 2014). Specific teacher-centred methods identified in literature commonly used by facilitators are the lecture method, questioning and answers, whole class discussion, demonstration, or experimentation (Mensah and Attah-Boison, 2015). Whiles Brophy (2006) and Garrett (2008) think that teacher-centred methods are necessary for classroom management, Cristillo et al. (2016) criticised teacher-centred pedagogy for hindering the development of higher-level cognitive skills among learners. Cristillo's view was further supported by UNESCO (2015b) that authoritarian and an-democratic regimes produce obedient passive citizenry. Mpho (2018) also revealed that teacher-centred methods were of little benefit to learners. These discussions suggest that teacher-centred pedagogy has the power to influence learners' skills acquisition for the job market. Based on this discussion, the study hypothesised that:

1. H_0 : There is a statistically significant relationship between teacher-centred methods and employability skills among university graduates.

Relationship between learner-centred methodology and employability skills

The learner-centred method is a teaching pedagogy in that learners are more active than the teacher, and the learner is the fulcrum around whom the educational process revolves (Taale and Ngman-Wara, 2015). The teacher plays a facilitator role in the learner-centred pedagogy; the main focus is not on what is taught but on the learner's activities. Teachers use a variety of methods to teach, and learners are encouraged to think for themselves (Taale and Ngman-Wara, 2015). Literature has identified learner-centred methods to include small group work or discussion, field trips, work-based learning, problem-based learning, brainstorming, role-play, industrial attachment and project work (Taale and Ngman-Wara, 2015).

Other learner-centred methods are student presentations, individualised learning, games and simulations and drama (Aede et al., 2014). Aede et al. (2014) found that learner-centred methods such as simulations and field trip context-based learning among others to have a higher propensity of equipping graduates with employability skills. Haugland et al. (2022) found small group discussion and presentation to have a higher potency of granting graduates better skills compared to teacher-centred methods like the lecture method. Despite these advantages, the learner-centred method is also criticised for creating a lack of commitment among learners and can easily lead to chaos in the classroom. Thus, learner-centred methods are well placed to influence how and what employability skills learners or graduates can acquire at the end of the learning process. Thus, this study hypothesised that

2. H_0 : There is a statistically significant relationship between the learner-centred method and employability skills among university graduates.

Relationship between teacher-centred, learner-centred teaching methods and employability skills

Teacher-centred and learner-centred teaching methods have been the two traditional major types of teaching pedagogy (Taale and Ngman-Wara, 2015). Though the two are treated differently with a different focus, it must be emphasised that the two are in a continuum, suggesting a relationship between teacher-centred and learner-centred teaching methods (Mensah and Attah-Boison, 2015). Thus, the teacher can be more of one approach and less of the other. That means that

some teacher-centred methods, such as lecture methods, can be used to introduce lessons to pave the way for the introduction and usage of learner-centred methods such as small group discussion, among others. Therefore, the disadvantages associated with one approach could be compensated for the other when used together. Hence this study hypothesised that:

3. H_0 : There is a statistically significant relationship between teacher-centred methods and Learner-centred method among university graduates.

Based on the fact that the two approaches are in a continuum (Taale and Ngman-Wara, 2015), it was conjectured that there could be a direct relationship between teacher-centred and learner-centred methods. Meanwhile, the mediating role of the learner-centred method on the relationship between the teacher-centred method and employability skills cannot also be underestimated (This mediating role has not been explored in the literature). That is, the effectiveness of the entire teaching pedagogy on employability skills could be dependent on deploying the learner-centred methods as a mediating precursor to the relationship between teacher-centred methods and the acquisition of employability skills. Thus, the demerits of one method are curtailed by the other methods and contribute to the better academic performance of learners and, most importantly, the acquisition of relevant employability skills. This study, therefore, hypothesised that:

4. H_0 : learner-centred methods statistically and significantly mediate the relationship between teacher-centred methods and employability skills among university graduates.

Relationship between formative assessment technique and employability skills

Formative assessment is a kind of systematic process for data gathering during the instructional period that serves as feedback to enable instructors to instruct learners more effectively (McManus, 2008). Feedback from formative assessment provides feedback to learners and instructors on how well a material or concept has been understood and delivered (William, 2011). Additionally, formative assessment provides feedback for modifying instruction and prescribing individual and group remedial work (Andrade et al., 2015). Thus, all questions asked in class to unravel learners' pre-concept brought to class or understanding of a segment of teaching before moving to the next segment are all examples of formative assessment Borich (2014). Formative assessment could come in the form of a class

exercise, quizzes, take-home assignments, teacher-made tests and group presentations (McMillan, 2014).

Formative assessment has been seen to improve learning and instruction, but its results are typically not used for course grades. However, Ozan and Kincal (2018) found that formative assessment positively affected self-regulation skills among students and significantly improved higher academic achievement and better attitudes toward class. Zainuddin et al. (2019) posit that formative assessment represents the physical output of skills and knowledge acquired at university, used to encourage student awareness of needed skills for the workplace and verify their attainment of these skills. Schildkamp et al. (2020) found that formative assessment contributes to acquiring data literacy skills, social pressure and collaboration among learners. Thus, the role of formative assessment in skills acquisition is still a relevant area attracting the attention of researchers. The need to examine the same from the developing economy perspective will also add to the literature. Therefore, this study hypothesised that:

5. H_0 : There is a statistically significant relationship between formative assessment and employability skills among university graduates.

Relationship between summative assessment and employability skills

Summative evaluation usually occurs at the end of the course or instructional unit. Summative assessments are evaluative rather than diagnostic, and assists in determining whether the objectives of a course are being attained or not (Taale and Ngman-Wara, 2015). It is primarily used to calculate course grades or to verify that students have mastered the targeted learning outcomes (Deeley, 2014). Its purpose is to assess the degree to which the instructional objectives have been met (Taale and Ngman-Wara, 2015). Additionally, it offers data for evaluating the suitability of the course objectives and the efficacy of the teaching. The summative evaluation depends on a large sample of the pertinent material and concentrates more broadly on all of the learning objectives of the instructional unit (Deeley, 2014).

Summative assessments are frequently norm-referenced, and students are evaluated according to how many objectives they demonstrate mastery of (Taale and Ngman-Wara, 2015). The summative evaluation may also be criterion-referenced, where students must demonstrate a list of skills or certain abilities, depending on the teaching strategy Taale and Ngman-Wara, 2015). Techniques typically employed include end-of-semester examination, project work, term essays, dissertation, and teaching practice. A study by Deeley (2014) found that employability skills can be enhanced through summative assessment. Alharahsheh and Pius (2019)

confirmed that summative assessment assesses key required skills, knowledge and understanding, and their overall professional development in relation to personal experiences. Thus, further studies are required to confirm further the influence of summative assessment on the acquisition of 21st-century employability skills among tertiary graduates. Thus, this study hypothesised that:

6. H_0 : There is a statistically significant relationship between summative assessment and employability skills among university graduates.

Relationship between formative and summative assessment and employability skills

Formative assessment could have a direct relationship with summative assessment. This is because, as much as formative assessment is diagnostic and summative assessment is evaluative, the two can together help to really give holistic feedback on the effectiveness of teaching methods used by teachers and attainment of learning objectives among learners. Thus, for better evaluation of learners' understanding of a section of contents delivered and the attainment of entire course objectives for the semester, using both formative assessment and formative assessment can be very effective tools in really determining students' academic performance or assigning course grades to learners. It is for this reason that this study hypothesised that:

7. H_0 : There is a statistically significant relationship between formative assessment and Summative assessment among university graduates.

The relationship between formative and summative assessment should not end with students' academic performance. This is because students' grades or academic performance should not be an end but a means of demonstrating competence and skills acquired. Thus, facilitators or teachers should not be interested in just good grades obtained by learners but also in how relevant employability skills have been acquired during the process. Additionally, learners should also be concerned with how to demonstrate relevant employability skills at the end of the semester activities and not be only concerned with how to obtain good course grades. Thus, summative assessment can influence the relationship between formative assessment and employability skills among learners. Based on the foregoing discussion, the study hypothesised that:

8. H_0 : Formative assessment statistically and significantly mediates the relationship between formative assessment and employability skills among university graduates.

21st-century employability. Employability skills are divided into general and technical employability skills. Some authors also termed it as hard and soft skills. Soft skills are defined as competencies that are not specifically tied to a particular job but are fundamental for every position because they are more focused on how people interact with one another at work. Critical decision-making, communications, problem-solving, self-confidence, negotiation, interpersonal skills, collaboration and work ethics, and self-management were the key 21st-century soft skills identified in the research as being necessary for employability (Patacsil and Tablatin, 2017; Pritchard and Atlay 2015; Robles, 2012; Wiliam, 2011). Rademacher et al. (2014) and Wiliam (2011) found the communication and problem-solving abilities to be essential capabilities among soft skills. Planning and managing projects and presentation-delivering abilities were also found to be essential 21st employability skills. Haseeb et al. (2021) revealed that relevant soft skills include personality traits, attributes or interpersonal skills, like adaptability, communication skills and teamwork, which distinguish one individual from the rest.

On the contrary, hard skills are specialised abilities required for a given work and are helpful for the technical tasks that the industry values most, future job profiles, and the creation of educational curricula (Kennedy et al., 2016; Patacsil and Tablatin, 2017). Computer operators, computer systems analysts, computer network support professionals, database administrators, network and computer systems administrators, and computer user support specialists are a few examples of ICT careers that require entry-level hard skills (Schneberger et al., 2007). Understanding of common software programmes, and programming languages, the ability to create user-friendly graphical user interfaces, databases, networking and knowledge of computer hardware are other technical abilities required for IT workers (Patacsil and Tablatin, 2017). Consequently, the literature implies that technical expertise is important.

Methodology

The descriptive survey design was deployed for this study. A sample of 784 undergraduate and postgraduate students (who were mostly workers) was drawn from a study population of 4416 for the study. The sample constituted 18% of the population. The sample selected was higher than the 336 suggested by the Cochran formula for sample determination and 354 samples suggested by Krejcie and Morgan (1970) sample determination Table (Segbenya et al., 2021). Both stratified and simple random sampling techniques were deployed for this study. The simple random sampling technique was used to ensure that all respondents had equal chances of being selected. Specifically, the lottery method of the simple random sampling technique was used for this study. The stratified sampling component was also

used to ensure respondents selected fall under both male and female categories, education and business programmes, undergraduate and postgraduate students and various employment sectors.

Measures

A Self-developed questionnaire was used for the data collection. The questionnaire was measured on a four-point Likert scale: strongly disagree, disagree, agree, and strongly agree. The four parts of the questionnaire comprised demographic characteristics of respondents, teaching methods, assessment methods and employability skills, which focused on the variables captured under the research hypotheses. Reliability and validity values were above the minimum threshold, suggesting that the instrument was good for use. Data were analysed with Partial Least Square-Structural Equation Modelling (PLS-SEM) for testing the hypotheses. All ethical considerations were ensured, including the freedom to participate and redraw, free from harm and anonymity.

Results and findings

The presentation of the results for this section is done in two parts: the demographic characteristics of respondents and the main results for the hypotheses testing for the study.

Demographic characteristics

The results for the demographic characteristics of respondents are presented in Table 1. The results show that most of the respondents were male (51%), 20–30 years (50.0%), employed in the education sector (34.6%) and had worked for about 1–5 years (53.1%). Additionally, most of the respondents were in non-managerial positions (66.5%) and were pursuing business programmes for further studies (40.7%).

Model measurement

The model's internal consistency was calculated, using the confirmatory factor analysis for the PLS algorithm model, and the results for the performance of each item measuring the constructs of the study are presented in Figure 1 and Figure 2. In Figure 1, all items captured in the questionnaire were presented, indicating that some items measured below the 0.60 thresholds for all five variables of the study.

Thus, all items measuring below the minimum threshold were removed, and the refined results are presented in Figure 2. Thus, the results in Figure 2 represent only items that loaded at 0.6 and above, as suggested by Hair et al. (2017) and Segbenya et al. (2022). From Figure 2, it is clear that the lecture method was not captured, indicating its irrelevance. Large group work was also omitted in Figure 2 because it was not relevant to the learner-centred approach.

Table 1. Demographic characteristics of respondents.

Demographic	Frequency	Percent
Gender		
Male	406	51.8
Female	378	48.2
Total	784	100.0
Age		
20–30 years	392	50.0
31–40 years	286	36.5
41–50 years	83	10.6
51 years and above	23	2.9
Total	784	100.0
Sector		
Unemployed-student	50	6.4
Education-G.E.S	271	34.6
Transport	14	1.8
Health	96	12.2
Electricity	25	3.2
Finance	100	12.8
Public	152	19.4
Water	5	0.6
Manufacturing	15	1.9
Self employed	23	2.9
Environmental protection agency	12	1.5
Security	18	2.3
Mining	2	0.3
Agriculture	1	0.1
Total	784	100.0
Tenure		
1–5 Year	416	53.1
6–10 Year	215	27.4
11 years and above	153	19.5
Total	784	100.0
Position		
Management member	263	33.5
Non- management member	521	66.5
Total	784	100.0
Category of academic programme		
Business	319	40.7
Education	265	33.8
Others	200	25.5
Total	784	100.0
Level of programme		
Undergraduates programme	414	52.8
Postgraduate programme	370	47.2
Total	784	100.0

Source: Field survey (2022).

Sit-down quizzes were also left out in the formative assessment, while the end-of-semester sit-down examination was also left out for the formation of summative assessment, as captured in Figure 2, because they were not relevant for the acquisition of 21st employability skills.

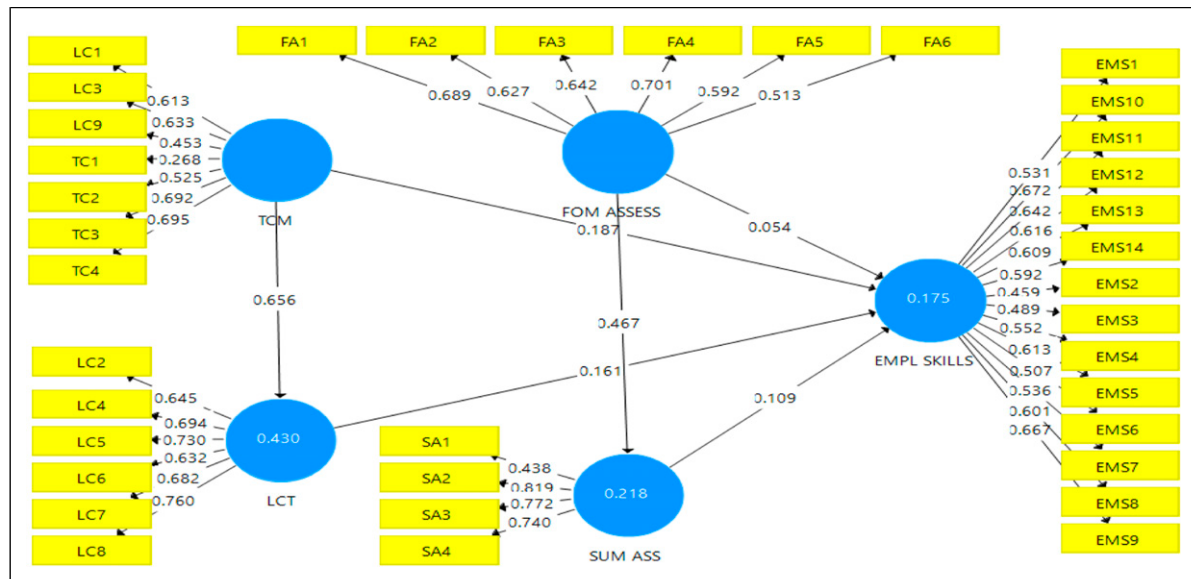


Figure 1. An algorithm for confirmatory factor analysis (All items).
Source: Field survey (2022).

Internal consistency measure

Four criteria were used to measure the reliability and validity of the model. These were rho A, Cronbach's Alpha, Composite Reliability and Average Variance Extracted (AVE) (Hair et al., 2017). The results for all these indicators are presented in Table 2. The results in Table 2 suggest that the rho_A values obtained were between 0.703 and 0.792. The values obtained for Cronbach's Alpha ranged from 0.703 to 0.787 for all the study variables, suggesting that all the constructs achieved the minimum threshold recommended (Hair et al., 2017). Furthermore, the Composite Reliability recorded values ranging from 0.808 to 0.849 and the Average Variance Extracted (AVE) also recorded values between 0.505 and 0.627, confirming that all constructs of the study achieved the minimum threshold recommended by Hair et al. (2017) and that the model achieved both reliability and validity standards of analysis.

Discriminant validity

Henseler, Ringle and Sarstedt's (2015) recommendation for using the Heterotrait-Monotrait Ratio (HTMT) to carry out discriminant validity for a model was undertaken to verify the uniqueness of each variable in the study, and the results are presented in Table 3. The results revealed that all diagonal loadings for the same variable were zero and between variables of the study were below 0.85 thresholds suggesting that discriminant validity was achieved for the PLS path model (Henseler et al., 2015).

Multicollinearity

The existence of multicollinearity could affect the results for the path significance (Enu-Kwesi, Koomson, Segbenya, and Annan-Prah, 2014), and for that matter, the presence of multicollinearity was checked, and the results are presented in Table 4. The results revealed that the inner values obtained using the variance inflated factors (VIF) as suggested by Hair et al. (2017) were below the maximum threshold of 3.30 as suggested by (Hair et al. (2017)). The results mean that the reflective model was free from the presence of multicollinearity and could be used to perform an inferential analysis (Enu-Kwesi et al., 2014).

Bootstrapping for structural model

Results for carrying out the bootstrapping sequence, using 5000 samples utilised in the PLS bootstrap procedure as recommended by Hair et al. (2017) and Segbenya et al. (2022) are presented in Figure 3. The results confirm the path coefficient results presented in Table 5.

Path analysis and hypotheses testing

Results for testing the eight hypotheses guiding the study are presented in Table 5. The initial part of the results show that R^2 values supported by the adjusted R-squared (explaining the variance in the model) suggest that the PLS-SEM model explained about 0.138 variances in employability skills (EMPL SKILLS), 0.293 variances in learner-centred method (LCT) and 0.115 summative

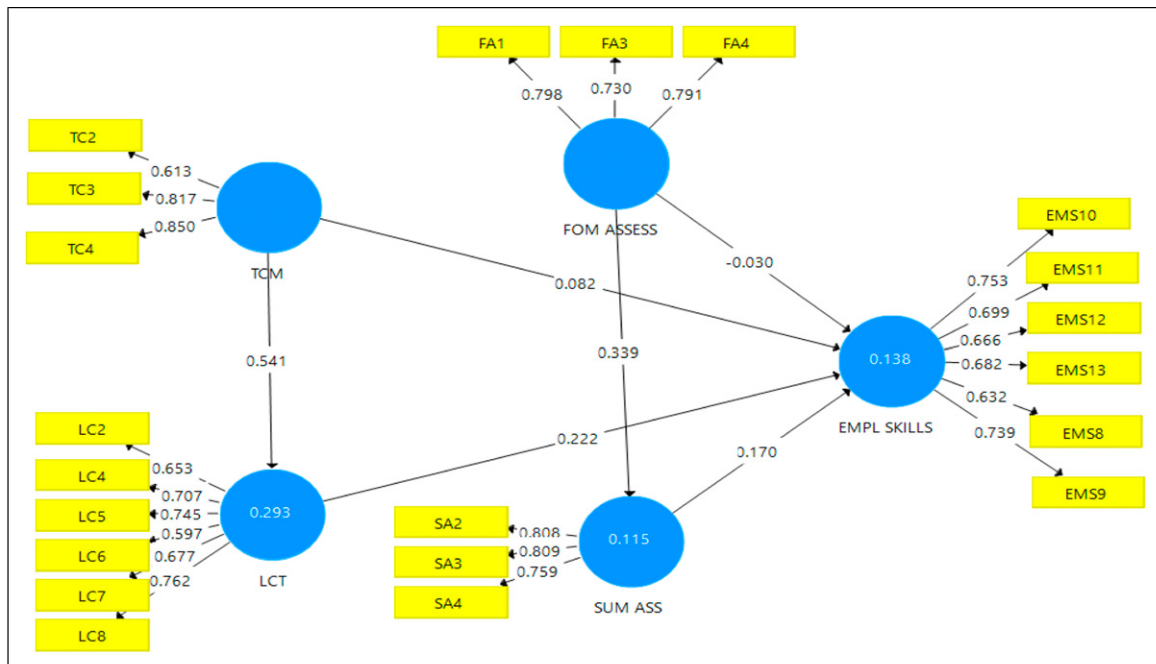


Figure 2. An algorithm for confirmatory factor analysis (Items that loaded well).
Source: Field survey (2022).

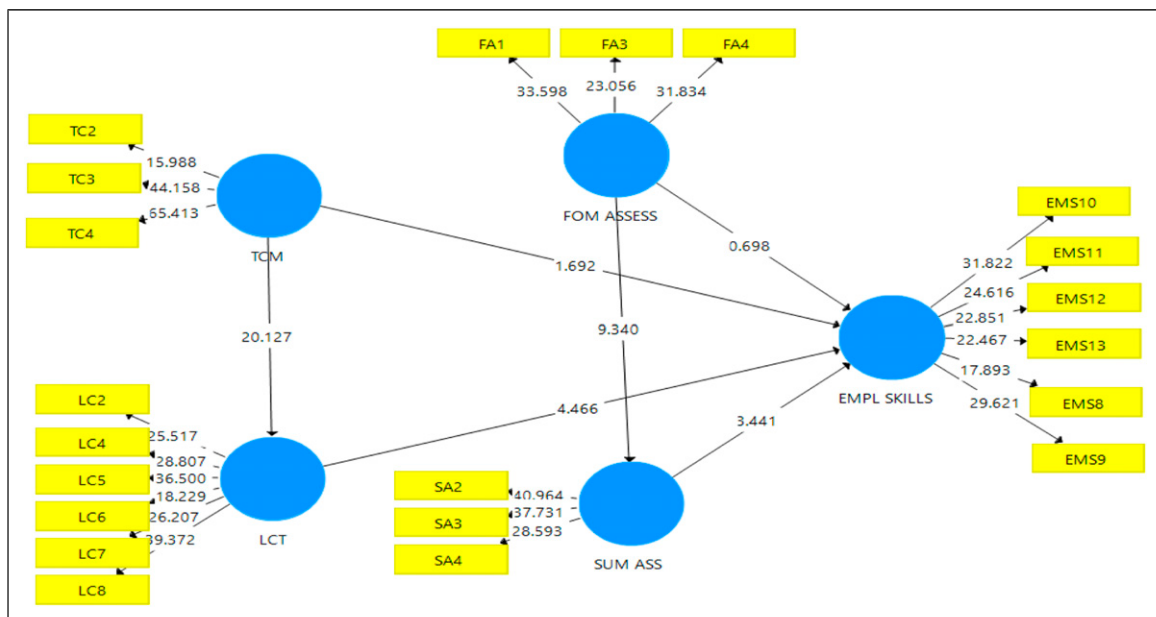


Figure 3. Bootstrapping results for path analysis.
Source: Field survey (2022).

assessment (SUM ASS) among workers pursuing undergraduate and postgraduate studies.

The second compartment of the results, as presented in Table 5, shows the significant path analysis results for all the eight hypotheses guiding the study. Six out of the eight

hypotheses of this study were supported since they achieved statistical significance. That is, the learner-centred method (LCT) had a statistically significant positive relationship with employability skills (EMPL SKILLS) at ($\beta = 0.222$, $t = 4.466$, $p = 0.000$) for hypothesis two. Also, the teacher-

Table 2. Construct reliability and validity.

	Cronbach's Alpha	rho_A	Composite reliability	Average Variance Extracted (AVE)
EMPL SKILLS	0.787	0.792	0.849	0.505
FOM ASSESS	0.704	0.708	0.817	0.599
LCT	0.781	0.787	0.846	0.509
SUM ASS	0.703	0.703	0.835	0.627
TCM	0.704	0.732	0.808	0.588

Source: Field survey (2022).

Table 3. Heterotrait-monotrait ratio (HTMT).

	EMPL SKILLS	FOM ASSESS	LCT	SUM ASS	TCM
EMPL SKILLS	0	—	—	—	—
FOM ASSESS	0.239	0	—	—	—
LCT	0.427	0.668	0	0	—
SUM ASS	0.382	0.489	0.692	—	—
TCM	0.290	0.679	0.703	0.290	0
—	—	—	—	—	—

Source: Field survey (2022).

Table 4. Collinearity statistics (VIF).

Inner VIF values					
—	EMPL SKILLS	FOM ASSESS	LCT	SUM ASS	TCM
EMPL SKILLS	—	—	—	—	—
FOM ASSESS	1.433	—	—	1.000	—
LCT	1.907	—	—	—	—
SUM ASS	1.382	—	—	—	—
TCM	1.539	—	1.000	—	—

Source: Field survey.

centred method (TCM) had a statistically significant relationship with the learner-centred method (LCT) at ($\beta = 0.541$, $t = 20.127$, $p = 0.000$) for hypothesis three.

Furthermore, the results in Table 5 also revealed that there was a statistically significant relationship between summative assessment (SUM ASS) and employability skills (EMPL SKILLS) at ($\beta = 0.170$, $t = 3.441$, $p = 0.000$) for hypothesis five. Formative assessment (FORM ASSESS) was also found to have had a statistically significant relationship with summative assessment (SUM ASS) at ($\beta = 0.339$, $t = 9.340$, $p = 0.000$) for hypothesis six. Lastly, the learner-centred method statistically and significantly mediated the relationship between the teacher-centred method (TCM) and employability skills at ($\beta = 0.120$, $t = 4.289$, $p = 0.000$) for hypothesis seven; and summative assessment statistically and significantly mediated the relationship between formative assessment (FORM ASSESS) and employability skills at ($\beta = 0.058$, $t = 3.293$, $p = 0.001$) for hypothesis eight.

Despite the model attaining a positive statistically significant relationship for six hypotheses of the study, it can also be found in Table 5 that the two hypotheses of the study were not supported. That is, there was a non-statistically significant relationship between formative assessment (FOM ASSESS) and employability skills (EMPL SKILLS) at ($\beta = 0.030$, $t = 0.698$, $p = 0.486$) for hypothesis four; and the teacher-centred method (TCM) and employability skills (EMPL SKILLS) at ($\beta = 0.082$, $t = 1.692$, $p = 0.091$) for hypothesis one. The effect sizes obtained for each of the significant paths reported in the model were based on Cohen's (1988) suggestion that an effect size of 0.010–0.401 was acceptable. The unidimensional nature of the confidence intervals for the variables for all significant paths also revealed valid and reliable significance. Additionally, the significant results were further strengthened by the confidence level of 97.5%, with a minor error margin of only 2.5% indicated by the statistics obtained from the upper and lower boundaries, respectively.

Table 5. Path coefficients.

R square					R square adjusted		
Empl skills	—	0.138	—	—	0.134	—	—
Lct	—	0.293	—	—	0.292	—	—
Sum ass	—	0.115	—	—	0.114	—	—
—	—	—	—	—	—	Confidence intervals	—
—	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (O/STDEV)	p values	2.5%	97.5% f^2
1. TCM -> EMPL SKILLS	0.082	0.081	0.049	1.692	0.091	-0.006	0.162 0.005
2. LCT -> EMPL SKILLS	0.222	0.227	0.050	4.466	0.000	0.127	0.325 0.030
3. TCM -> LCT	0.541	0.543	0.027	20.127	0.000	0.490	0.595 0.414
4. FOM ASSESS -> EMPL SKILLS	0.030	-0.033	0.043	0.698	0.486	-0.116	0.052 0.001
5. SUM ASS -> EMPL SKILLS	0.170	0.170	0.050	3.441	0.001	0.052	0.259 0.024
6. FOM ASSESS -> SUM ASS	0.339	0.342	0.036	9.340	0.000	0.270	0.413 0.130
Specific indirect effects	—	—	—	—	—	—	—
7. TCM -> LCT -> EMPL SKILLS	0.120	0.123	0.028	4.289	0.000	0.068	0.177 —
8. FOM ASSESS -> SUM ASS -> EMPL SKILLS	0.058	0.058	0.018	3.293	0.001	0.019	0.091 —

Source: Field survey (2022).

IPMA (Importance performance map analysis)

PLS Importance Performance Map Analysis (IPMA) was conducted to determine the importance and performance of the latent variables measuring the study's exogenous variable; the results can be seen in Table 6. The IPMA looks at the performance value for each latent variable in the PLS model, whereas the path coefficient shows how important a construct is in explaining another. On a scale from 0 to 100, these numbers represent the average values of each latent score (100). If the latent variable performs better, the closer its value is to 100. As a result, we merged the importance and performance information in the IPMA analysis by plotting the importance on the X-axis and performance on the Y-axis, as seen in Figure 4. This allowed us to calculate the IPMA. Consequently, IPMA analysis aids organisations in identifying areas for improvement (Segbenya and Okorley, 2022: 13). The IPMA presented in Table 6 means that even though formative assessment obtained the highest performance value of 67.194, it was not the most important variable of the study for employability skills since it recorded the lowest value of 0.028. Thus, the most important variable in terms of the prediction of employability skills was learner-centred method with an importance value of 0.222.

The performance and importance values reported in Table 6 are equally displayed in Figure 4, and the results are further confirmation of what was reported in Table 6. It is

Table 6. IPMA analysis for employability skills (EMPL SKILLS).

	Importance	Performances
FOM ASSESS	0.028	67.194
LCT	0.222	53.784
SUM ASS	0.170	61.645
TCM	0.202	64.960

Source: Field survey (2022).

clear that the most important variable in blue found first in the right column in Figure 4 was the learner-centred method, followed by the teacher-centred method in the yellowish colour.

Graphical representation of the PLS IPMA path results

The results for a pictographic view of the IPMA PLS path model are presented in Figure 5. Segbenya et al. (2022) posit that the performance values of each latent variable of the IPMA are different from the R^2 values of the endogenous latent variables indicated in the PLS path model. Additionally, the authors also revealed that the IPMA results revealed the unstandardised outer weights

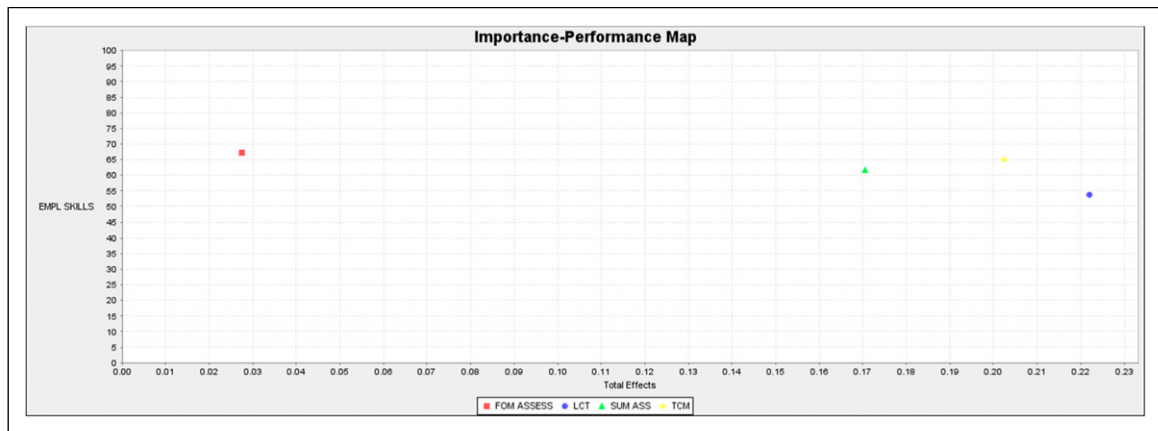


Figure 4. IPMA analysis presented on X an Y axis.
Source: Field survey (2022).

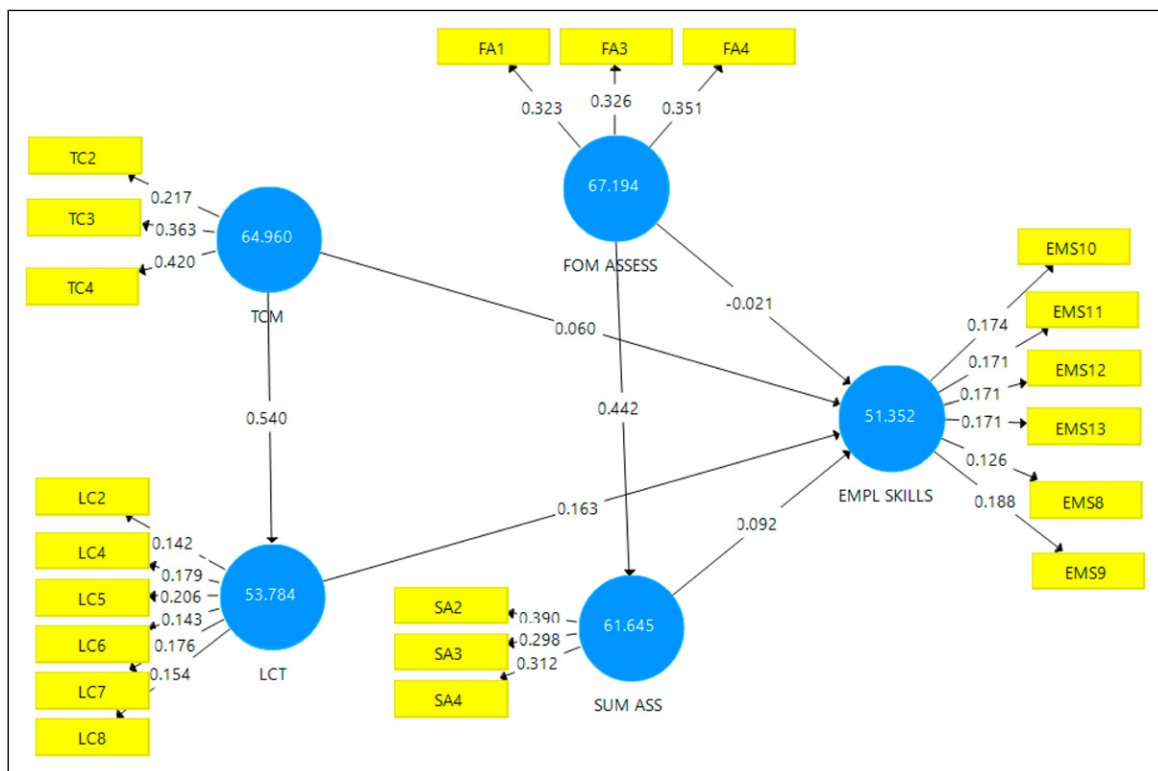


Figure 5. IPMA graphical results.
Source: Field survey (2022).

of the measurement models (formative and reflective) and not the standardised outer loading or weights. Thus, from [Figure 5](#), the beta values highlighted in the outer model indicate the importance of each item to the construct and not the loading. The inner values also determined the performance values of the individual construct in relation to the endogenous variable and not the total variance explained.

Discussion of the results

The results for the second hypothesis that the learner-centred method had a statistically significant positive relationship with employability skills can be explained further. The results mean that teaching methods that are learner-centred had the propensity to equip graduates with the necessary employability skills. Specific learner-centred methods found in this study

were field trips, work-based learning, problem-based learning, brainstorming and role-play teaching methods. The results further mean that as much as learners are exposed to this method of learning, the greater their chances of acquiring employability skills. Thus, any percentage increase in the usage of these learning methods will result in the same percentage increase in the acquisition of employability skills. The results are in tandem with the findings of [Haugland et al. \(2022\)](#) that learner-centred methods greatly influence acquisition of practical employability skills.

The results of hypothesis three that the teacher-centred method significantly influences the learner-centred method mean that the teacher-centred method still has a role to play in preparing students for the job market. That is, as much as the learner-centred method impact significantly on employability skills (hypothesis three), some course content needs to be delivered with the help of teacher centred method. Thus, a blend of teacher-centred methods with learner-centred methods could be helpful in some regards. The specific teacher-centred methods found in this study were questioning and response, whole class discussion and demonstration. The results agree with the findings of [Taale and Ngman-Wara \(2015\)](#) and [Mensah and Attah-Boison \(2015\)](#) that some teacher-centred methods are still relevant for some course delivery.

Findings for hypothesis five that summative assessment significantly relates to employability skills means that a per cent increase in seriousness attached to summative assessment will lead to the same percentage increase in equipping graduates with employability skills. The specific summative assessments methods found by this study were project work or long-essays, dissertations, and teaching practices. These types of summative assessment afford graduates to learn practical skills such as communication (written and oral), leadership, presentation, research, and data analytical skills, among others. Thus, the more graduates are exposed to these types of assessments instead of the seat down examination, the better their chances of acquiring employability skills. Thus, the assertion by [Deeley \(2014\)](#) and [Alharahsheh and Pius \(2019\)](#) that summative assessment influences on employability skills is upheld by this study.

The findings of this study that formative assessment attained a statistically significant relationship with summative assessment can be explained further. The results mean that any percentage increase in formative assessment of students will result in an equal percentage increase in students' summative assessment. Thus, three main formative assessments found by this study, such as class exercise (before, during or after teaching), take-home assignments and teacher-made tests, were very instrumental in helping adult learners who are also workers to do better in their summative assessments. This suggests the importance of formative assessment while delivering course contents. Though formative activities are additional responsibilities for facilitators in terms of preparing questions, marking,

imputing, and recording marks, storage, and safekeeping to end of the academic term, facilitators need to do more of such activities to ensure the overall academic performance of learners. The findings corroborate the findings of [Taale and Ngman-Wara \(2015\)](#) that formative assessment is important for learners' academic performance.

Findings for hypothesis seven that the learner-centred method statistically and significantly mediated the relationship between the teacher-centred method and employability skills have an explanation for the non-significant relationship recorded for teacher-centred method and employability skills recorded for hypothesis one. The explanation of these findings for hypotheses one and seven is that the teacher-centred method does not equip learners with employability skills but does so only through the presence of the learner-centred method. Thus, facilitators need to use teacher-centred methods sparingly and depend heavily on learner-centred methods such as problem-based learning, brainstorming and role-play teaching methods to enhance the acquisition of employability skills of graduates greatly. This contributes to knowledge since the mediating effect of the learner-centred method on the relationship between the teacher-centred method and employability skills among graduates does not exist in the literature.

Finally, findings for hypothesis eight that summative assessment statistically and significantly mediated the relationship between formative assessment and employability skills have an explanation for the non-significant relationship recorded for hypothesis four between formative assessment and employability skills. The results mean that formative assessments, including class exercises, take-home assignments, and teacher-made tests, do not directly equip graduates with employability skills but do so through summative assessment. Thus, the relevance of assessment for employability skills is highly dependent on summative assessment. The findings, therefore, are another contribution to knowledge on assessment and employability from a developing country perspective since this does not exist in the literature.

Theoretical and practical implications

The findings of this study have several implications for the job-matching theory that guided this study. The position of the theory that employability skills acquired must match those required by employers has been investigated and supported by this study. This study, however, added to the theory with specific findings on how higher educational institutions can help achieve congruity between skills required and skills acquired. Thus, this study contributed to the theory of job matching that educational institutions can use the teaching and assessment methods to achieve this. Specific type of teaching methods and assessment methods that are relevant for equipping graduates with

21st-century employability skills were found by this study. Additionally, this study contributed to job-matching theory that teacher-centred pedagogy and formative assessment are respectively mediated by learner-centred and summative assessment to be able to equip graduates with employability skills.

The outcome of this study also has several practical implications for higher educational institutions and facilitators. The first practical implication is that the teacher-centred method is very weak in equipping graduates with employability skills. Thus, there is a need for facilitators to use learner-centred pedagogies in delivering their course contents. Specifically, this study found field trips, work-based learning, problem-based learning, brainstorming and role-play as learner centred-techniques that have the potential of equipping graduates with employability skills.

Another practical implication of the findings of this study is that formative assessment does not adequately impact graduates' employability skills. Rather facilitators will need to deploy summative assessment since it has a greater propensity to equip graduates with the needed employability skills. Meanwhile, a sit-down examination was found to have no potency of equipping graduates with 21st employability skills. This calls for higher education institutions on to shift away from assigning higher marks or scores for such components of assessment.

Conclusion and recommendations

This study modelled the effect of teaching and assessment methods on the acquisition of 21st employability skills among university graduates. The study found that learner-centred methods and summative assessment had a statistically significant relationship with employability skills. Furthermore, the formative assessment had a significant relationship with summative assessment, and the teacher-centred method had a significant relationship with the learner-centred method. Lastly, the learner-centred method significantly mediated the relationship between the teacher-centred method and employability skills; and summative assessment also significantly mediated the relationship between formative assessment and employability skills.

The conclusion of this study demands specific recommendations on the part of managers of educational institutions, facilitators and learners. It is, therefore, recommended that facilitators should adopt more learner-centred pedagogy in facilitating the content of their academic programmes. Facilitators should adopt methods such as work-based, problem-based learning, project work, brainstorming, role-play and industrial attachment for the facilitation of their courses. This method makes the learner an active participant and helps to acquire practical employability skills. Management will need to provide the

necessary managerial and logistical support for the facilitators to be able to deploy these learner-centred methods.

It is also recommended that managers of educational institutions orient and encourage facilitators employed for the various courses on the need to adopt the learner-centred pedagogy. Furthermore, it is recommended that managers of educational institutions should shift away from long hours of sit-down examinations at the end of the term/semester to a more practical summative assessment for learners. These could include assigning more scores and time to summative assessments such as teaching practice, problem-solving, case studies, dissertations or long essays. This will help learners to acquire the employability skills required in the 21st century adequately.

Finally, it is recommended that learners take all forms of learner-centred and summative assessment methods, including group work or discussion and presentation by their facilitators seriously and respond to them favourably and timely to enhance their effort to acquire employability skills from their educational institutions. The Ministry of Education and Ghana Tertiary Education Commission and Ghana Accreditation Board will also need to ensure that institutions and academic programmes accredited clearly focus on learner-centred methods and do more scores for grading are allocated to problem-based learning and work-based learning rather than sit-down examination.

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Supplemental Material

Supplemental material for this article is available online.

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