Development and validation of an inventory to evaluate the implementation of main educational elements in promoting higher-order thinking skills

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Received: 9 June 2017; Accepted: 1 November 2; Published: 4 December 2017

A valid, reliable and practical instrument is needed to evaluate the implementation of higher order thinking skills (HOTs) amongst teachers in primary schools. The purpose of this study was to assess the validity and reliability of an inventory in promoting HOTs. The inventory was adapted from Nurasyikin (2016), Gulistan et. al (2016) and Gonzales and Fugan (2012). The instrument in the form of questionnaire was distributed to a sample of 220 primary school teachers teaching Islamic education subject. The content validity was assessed by a group of experts, and the construct validity was measured by an Exploratory Factor Analysis. The reliability of the instrument was measured by the alpha coefficient reliability or Cronbach Alpha. Results of Exploratory Factor Analysis suggested that 12 items needed to be removed due to their non-dimensionality as they had more or less equal loadings on several factors. The instrument developed yielded high values of internal consistency as reflected by the Cronbach alpha values. The final draft of the instrument contained 107 items which was considered valid and reliable. Even though the validity and reliability of the instrument were within the acceptable range, more data needed to be gathered with a bigger sample, and further analysis using an Item Response Theory (IRT) model could be used to explore deeper into the psychometric characteristics of the items.

Keywords: Curriculum, teaching strategies, assessment practises, HOTs, exploratory factor analysis

Introduction

Malaysia foresees the importance of education in producing the kind of manpower needed to achieve Vision 2020. By the year 2020, Malaysia is aiming to be a fully industrialized country in its own mould with highly knowledgeable and skilful workers. In order to achieve this, all we have to do is to prepare the country with an education system which provides the most appropriate and high quality curriculum, teachers, delivery system, infrastructure, teaching strategies and assessment system which could meet the present and future demands. The basis

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for the success of an education system depends on quality of the National Curriculum which will affect the human capital quality we are aiming for (Bahagian Pembangunan Kurikulum, 2014). Hence, the Education Ministry is trying to come out with a curriculum which is at par with the international standards focusing in aspects such as creative skills, problem-solving and innovation. The objective of the National Curriculum is to produce a balanced future generations which master the 21st century skills. Students who master the 21st century skills with the ability to think creatively and critically are able to compete globally. These skills are in line with the six students’ aspirations as stated in the Malaysian Education Blueprint, in which each student will have the knowledge, thinking skills, leadership skills, bilingual proficiency, ethics and spirituality and also national identity.

A research conducted by the Academy of Leadership for Higher Studies (AKEPT) found that fifty percent of the teachers observed failed to deliver their lessons effectively especially in their ability to inculcate HOTs (Ministry of Education, 2013). Teachers consequently make erroneous decisions while using various methods in their assessment practices (Shepard, 2000). In addition, teachers exhibit misconceptions about their assessment practices while evaluating student academic achievement. This might be due to lack of assessment knowledge and skills in assessment practices (McMillan, 2001). This situation is quite disturbing as classroom assessment is meant to support instruction and enhance students’ learning (Shepard, 2000). Haris and Hofer (2009) believe that learning activities influence the daily instructional development, and the planning has to focus on students’ standard and curriculum which is related to learning process, the outcome of learning and also the existing technology. So, to produce an effective teaching, a curriculum approach based on technology has to be produced which includes teachers’ technique in planning instruction and also their knowledge in planning instruction. Furthermore, most teachers, especially new teachers are having problems in planning teaching and fail to manage teaching effectively especially when it comes to teaching HOTs (Nurasyikin, 2016). Teachers feel that when planning teaching, it is difficult to transform it into words to write it in their daily lesson plan book. Some teachers do not understand the rational in planning teaching and the use of teaching objectives (Orstein & Lasley, 2000). Most senior teacher focusses more on the content and instructional activities rather than planning for teaching objective. This is quite worrying because teaching objective is an important component in the curriculum as it will give a quite a big impact to the teaching in the classroom.

**Background and rationale**

Previously, Critical and Creative Thinking Skills (CCTS) have been introduced in 1994 through Primary School New Curriculum (KBSR) and Secondary School New Curriculum (KBSM). Primary School Standard Curriculum (KSSR), which is introduced in 2011 is an effort to strengthen thinking skills with more emphasis on reasoning skills. Various thinking skills have been combined for the purpose of making judgments and assessments in problem solving processes. In facing global competition in the economic environment which is driven by innovation, MOE has emphasized HOTs in the school system. By definition, HOTs is an abstract thinking which integrates informational systems and follow rules of logic and judgment (Ivie, 1998). Norman (2009) defines HOTs as a non-algorithmic and complex mode of thinking which could generates various solutions to the proposed problem. In general, there are two types of thinking skills or cognitive skills which are higher and lower-order of thinking skills. If the thinking skills involve acquiring and understanding knowledge, it is called LOTs whereas if it involves applying and evaluating knowledge, it is called HOTs (Ozgelen, 2012). According to Bahagian Pembangunan Kurikulum (Curriculum Development Centre) (BPK) (2014), basically, the implementation of HOTs in the Malaysian education system
context is using a comprehensive and systematic approach which includes three main elements (curriculum, pedagogy and assessment) together with the supporting elements (co-curriculum, community and private support and also resources and capacity building factors). All these elements are supposed to support each other. HOTs is applied in the school system so that students do not just memorize, but also understand and know what they are learning, and they are using common sense at a high level by mastering skills like evaluating, application, analysing and innovating. HOTs enable students to apply knowledge, skills and values in making reflection to solve problems, innovating and able to invent something (BPK, 2014).

In improving education, there are many aspects which have to be considered because all aspects are important in improving students learning. It includes assessment, well-prepared teachers, well-designed and coherent curriculum and also a skilful instruction which is adapted to students’ needs and personalized learning environments (Darling-Hammond, 2000). Providing students’ with these key features of a sound education in instilling HOTs in students is a major foundation of an accountability system. In general, curriculum is seen an active process (Rajendran, 2016). However, curriculum to teach thinking skills has to have certain characteristics which have to be different from traditional curriculum. A thinking curriculum has to be flexible so that teachers can plan, implement and assess learning based on the uniqueness of each student. Then, it integrates subject matter and thinking skills, promotes in-depth learning of subject matter and processes related to it, the content and process objectives are situated in real-world tasks by using prior knowledge, has to be dynamic and gain findings from various research and lastly it should be taught as part of the core curriculum. Even, Costa (1999) also suggested that in order to produce a thinking curriculum, it has to have at least seven main shift which are shifting from innate intelligence to effort-based learning, from transmitting meaning to constructing meaning, from compartmentalized subjects to trans-disciplinary learning, from knowing right answers to knowing how to behave with wrong answers, from uniformity to diversity, from external evaluation to self-evaluation, from motivating others to learn to liberating the human innate passion for learning. In addition, a clear specific and measurable learning outcome could produce a quality and valid assessment (Lim et al, 2016). In general, in order to produce quality teachers for the future, Malaysia really needs a well-designed curriculum which encompasses content, pedagogy and evaluation (Nagendralingan et al, 2014).

Teaching strategies play a vital role in enhancing students' acquisition of HOTs (Constantinou & Kuys, 2013). According to Rajendran (2016), there are six strategies which could be used in enhancing thinking; questioning, metacognitive approaches, componential approaches, heuristic based approaches, critical thinking approaches and creative thinking approaches. Some of the characteristics of effective strategies for developing HOTs are activating students’ prior knowledge, using classroom activities such as hand-on inquiry, grouping approach or using different forms of assessment such as alternative assessment or evaluation approaches (Gulistan et al., 2015). Miri et al. (2007) suggest that teachers could create an environment to give opportunities to students to explore more about the complex problems or conduct group activities to promote metacognition. Next is on assessment practices related to HOTs. Classroom assessment should support instruction and also increase students’ learning (Shepard, 2000). Thus, teachers need to be able to assess the acquisition of thinking skills by their students. However, this is not an easy task (Rajendran, 2016). Why? Because there is no single definition of thinking and the fact that there is no multiple choice tests that effectively tests for higher-order thinking disposition. However, the study by Suah et al. (2009) found that the form of assessment frequently used by school teachers was multiple-choice objective test. This is something to think about seriously by the educationist. Few characteristics have been listed out if teachers were to assess the acquisition of thinking skills in students. First, students are required to develop responses rather than just select
predetermined options, to elicit HOTs in addition to basic skills, to evaluate holistic projects directly, to synthesize with classroom instruction, to do portfolios over an extended period of time, to allow for the possibility of multiple peer judgments.

If we are to compare teaching of thinking skills between Malaysia and United Kingdom in general, there are some similarities and some differences as well (Rajendran, 2016). The education system in Malaysia today is actually rooted from the British education system so it still maintains the centralized system and conducting examinations. However, an explicit attempt to teach thinking skills in Malaysia was started in schools in 1993 whereas in UK it was developed a long time ago inspired by the work of Feuerstein, Lipman and Edward de Bono. Finally, the need to have a valid and reliable instrument to evaluate the implementation of teacher practices in instilling HOTs in Islamic education teaching is becoming increasingly important. When talking about HOTs people use to relate it to science and mathematics subject only. Validity (measuring what it is supposed to measure) and reliability (the extent to which scores are free of measurement error) of the questionnaire are the most important things to consider when dealing with measurement (Barroon and Abd Rahman, 2015; Muijs, 2011). In this study, content validity is checked by the experts in this field. Construct validity is the extent to which a set of items actually reflect the theoretical latent construct those items are designed to measure (Hair et al., 2006) and in this study it is measured using EFA. And, internal reliability is a concept referring to the degree to which all of the items are measuring the same underlying construct (Pallant, 2007) whereby it is measured using Cronbach Alpha value. When a questionnaire is valid and reliable, a researcher will have confidence in the results obtained using those questionnaires during data collection. Hence, the purpose of this study is to develop an instrument to evaluate teachers’ practices including in curriculum, teaching pedagogy and assessment practices in instilling HOTs and LOTs.

The implementation of the curriculum, teaching strategies and assessment practices should facilitate the transition of students’ knowledge and skills into responsible actions. So, this study aims at investigating all of the main elements used by teachers to improve higher cognitive skills in an Islamic education subject for upper primary schools. This research is important as it produces instruments on the three main elements in influencing HOTs in teaching. To date, no study has developed and validated instruments on HOTs implementation for Islamic education teachings. In future research, these instruments will be used to look at the linkages in the following sets of elements: curriculum, pedagogy, assessment and students’ HOTs and LOTs achievement in Islamic education subject. Recent study found that there is quite a lot of research that has conducted concerning HOTs in science and mathematics subjects but, not many research have been carried out on HOTs in Islamic education among primary school children (Wan Ismail et. al., 2016).

Research objectives

The purpose of this study is to develop and assess the validity and reliability of an inventory for assessing teacher practises in the context of teaching HOTs in an Islamic education subject for upper primary schools. It explores teachers’ main elements of practices in implementing HOTs in teaching and learning. The three main elements involved are curriculum, pedagogy and assessment practises, as suggested by the Malaysian government. Specifically, this study seeks to:

a) Develop an inventory for evaluating teacher practises in instilling HOTs in an Islamic education subject;
b) Establish the validity of the inventory; and
c) Establish the reliability of the inventory.
Methodology

This survey was piloted with 220 primary school teachers teaching Islamic education in Perak. Thirty primary schools in Perak were selected through purposive sampling. I have used purposive sampling due to practical reasons. Initially, the instrument developed was trialled by 10 teachers to check for the appropriateness of the language and content. Analysis showed that all the items were appropriate. However, some minor changes have been made to phrases which were a bit ambiguous.

Development of the instrument

The instrument is developed based on the three main elements (curriculum, pedagogy and assessment) which support each other in HOTs implementation in schools as suggested by the Malaysian government (BPK, 2014). Curriculum is adapted from the Daily Lesson Plan Preparation Inventory (K-RPH) (Nurasyikin, 2016), pedagogy is adapted from Strategies Used Survey Questionnaire (SUS-Q) developed by Gulistan et. al (2016) and assessment practices inventory is adapted from the CAP-Q inventory developed by Gonzales and Fugan (2012).

a) Development of instrument on Daily Lesson Plan

Nurasyikin (2016) developed an inventory (K-RPH inventory) to determine the level of student teachers’ understanding on daily Lesson Plan. Data from 388 student teachers from Universiti Pendidikan Sultan Idris on the instrument was analysed descriptively. The reliability and validity of the instrument was analysed using Rasch measurement model. It was found that the student teachers’ have a high level of understanding on daily Lesson Plan. The inventory which was a double-layer instrument contains 32 items with 160 rubrics (which make its total items as160 items) that addressed issues of understanding towards daily Lesson Plan. The instrument used a 5-point scale following a total of 5 rubrics. Each rubric had 1 to 2 scores. Maximum score was 10 point and minimum is 0. Scoring scale consisted of 3 score (0= none; 1=some; and 2=all). With this score, we transferred it into an ordinal scale as in Table 1. The 160 items Nurasyikin’s K-RPH inventory covered a wide range of daily Lesson Plan planning as shown in Table 2. Items in Nurasyikin’s instrument were organized into several components; i) Analyzing Daily Lesson Plan; ii) Determining Objectives in daily Lesson Plan; iii) Organizing Learning experiences; and iv) Assessment and reflection.

Table 1. Transfer from rubric score to ordinal score.

| Rubric Score | Ordinal Score |
|--------------|---------------|
| 0 – 2        | Very Low (1)  |
| 3 – 4        | Low (2)       |
| 5 – 6        | Middle (3)    |
| 7 – 8        | High (4)      |
| 9 – 10       | Very high (5) |
Table 2. Constructs and variables of K-RPH instrument.

| Construct                              | Number of Items | Sub-construct                                                                 | Variables                                                                 |
|----------------------------------------|-----------------|-------------------------------------------------------------------------------|---------------------------------------------------------------------------|
| Analysing daily Lesson Plan            | 11              | Daily Lesson Plan                                                             | The use of daily lesson plan                                             |
|                                        |                 | Date and day                                                                  | Rationale for writing date and day                                        |
|                                        |                 | Time component                                                                | Rationale for writing time                                               |
|                                        |                 | Class component                                                               | Students’ background                                                     |
|                                        |                 | Subject component                                                             | Rationale for writing subject                                            |
|                                        |                 | Title or topic component                                                      | Rationale for writing title or topic                                      |
|                                        |                 | Teaching aids (TA) and learning aids (LA) component                           | Rationale for using TA and LA                                            |
|                                        |                 | Existing knowledge                                                           | Rationale for choosing TA and LA                                         |
|                                        |                 |                                                                               | Rationale to know the existing knowledge                                 |
| Determining Objectives in daily Lesson Plan | 5              | Learning objectives TA and LA                                                 | The function of learning objective                                       |
|                                        |                 |                                                                               | Reference used to form objective                                         |
|                                        |                 |                                                                               | Characteristics of learning objective                                    |
|                                        |                 |                                                                               | Reference in choosing TA                                                 |
|                                        |                 |                                                                               | Things to consider when using TA                                         |
| Organizing Learning Experiences        | 10              | Rational of Induction set planning                                            | Induction set function                                                   |
|                                        |                 | Teaching strategy                                                             | Induction set activity                                                   |
|                                        |                 | Teaching strategy characteristics                                             | Teaching strategy used                                                   |
|                                        |                 | Learning strategy                                                             | Learning strategy                                                        |
|                                        |                 | Factors affecting teaching content layout                                     | Factors affecting teaching content layout                                 |
|                                        |                 | How to lay out classroom?                                                    | How to lay out classroom?                                                |
|                                        |                 | Learning activity characteristics                                             | Learning activity characteristics                                       |
|                                        |                 | Factors affecting learning activity planning?                                 | Factors affecting learning activity planning?                            |
|                                        |                 | Students’ assignment characteristics                                         | Students’ assignment characteristics                                    |
| Assessment and Reflection              | 6               | Assessment Reflection                                                        | Why writing assessment component?                                       |
|                                        |                 |                                                                               | The use of assessment results                                            |
|                                        |                 |                                                                               | The use of evaluation instrument                                         |
|                                        |                 |                                                                               | Grading                                                                   |
|                                        |                 |                                                                               | Why do we need to record reflection?                                     |
|                                        |                 |                                                                               | The importance of writing students’ comments in reflection section        |

b) Development of instrument on Teaching Strategy

The instrument for teaching strategy is adapted from Gulistan et al. (2016). The inventory, known as Strategies Used Survey Questionnaire (SUS-Q) developed by Gulistan is to determine strategies used by 7th grade secondary science teachers in teaching science, consisting of 34 items in the form of 5-point Likert scale (1 = never to 5 = always) based on the constructs of cognitive development. After validity and reliability processes, there are only 31 items.

The sample for the study was 212 7th grade science teachers in the Iraqi-Kurdistan region. Data were analysed by adopting descriptive and inferential statistics such as t-test and one-way ANOVA. Findings of the study indicated that the most popular strategy among 7th grade science teachers was the strategy for acquiring knowledge which focused more on memorizing basic concepts in science, while the least used strategy by science teachers was
the strategy for applying knowledge such as problem solving and hands-on activities. Items in Gulistan’s instrument were organized into three main constructs; i) Strategies used for acquiring the knowledge (14 items); ii) Strategies used for applying knowledge (8 items); and iii) Reflection on knowledge strategies (9 items).

Why is this instrument chosen? Firstly, it is an instrument to determine strategies used by science teachers to teach HOTs in science education so it is suitable with this study in determining teaching strategies concerning HOTs in Islamic education subject. Secondly, this instrument is developed to suit the schools in Iraqi Kurdistan region which is not a developed country and still in the process of developing its HOTs. What changes have been done? The instrument is adapted to suit this study by referring to the Curriculum and Assessment Standard Document (DSKP) for Islamic education subject for primary Year 4, 5 and 6 and also the Administration Guidelines for Islamic education subjects produced by Ministry of Education in 2015. Changes are made to suit the teaching of Islamic education subject at the primary level.

c) Development of inventory on Classroom Assessment Practises

The inventory for classroom assessment practises (CAP-Q) of teachers is adapted from Gonzales and Fugan (2012). Initially, the inventory developed by Gonzales and Fugan consists of 89-items altogether in the form of 5-point Likert scale (1 = never to 5 = always). The inventory consists of five main constructs which are assessment planning, assessment item preparation, assessment administration and scoring, reporting of scores and grading and assessment data utilization and evaluation.

The sample for the study was a group of primary school teacher from the Philippines, Nepal and the Kyrgyz Republic. Data from the study were analysed by performing exploratory factor analyses and reliability test. The results showed that the factor analysis supported a five-factor structure accounting for 70.71% of the variance of the questionnaire. The items also showed satisfactory internal consistency. Finally, 56 items were retained. Finally, items were organized into several components: i) Assessment planning (14 items); ii) Assessment item preparation (20 items); iii) Assessment administration and scoring (12 items); iv) Reporting of scores and grading (5 items) and; v) Assessment data utilization and evaluation (5 items).

Why is this instrument chosen? Firstly, it is an instrument to determine assessment practises by primary school teachers in few Asian countries so it is suitable with this study. Secondly, the inventory focuses on activities that primary school teachers do in relation to conducting classroom assessment including formative and summative assessments. It is not focusing on concept, belief or knowledge of primary school teachers as most of the inventory has but more to teacher practises. Since assessment in Malaysia also includes both types of assessment so this inventory seems to suit best. Next, what changes have been done? The instrument is adapted to suit this study by referring to the Curriculum and Assessment Standard Document (DSKP) for Islamic education subject for Year 4, 5 and 6 and also Administration Guidelines for Islamic education subject produced by MOE in 2015. Changes are made to suit the assessment for Islamic education subject at primary level.

The newly developed teaching practises in the implementation of HOTs inventory of this study consists of 120 items (excluding demographic information that were organized in four sections as below: Section A: Demographic Profile; Section B: Daily Lesson Plan (32 Items); Section C: Teaching Strategies (31 items); and Section D: Classroom Assessment Practises (56 items). Respondents are given sufficient time to complete the questionnaire since it is not a test, but their perception on the issues only. The questionnaires are then gathered,
and then data are analysed concerning characteristics of the items using factor analysis and internal consistency measure in order to validate the inventory.

Findings and discussions

The findings discussed in this paper are organized around two important aspects, namely validity and reliability of the instruments.

Validity of the instrument

Firstly, the validity of the instrument is established. The adequacy of the data is checked using KMO Bartlett test. A statistic value of 0.947 is obtained which indicates that 94.7 percent of the variables properties are explained by the data thus, factor analysis would be meaningful. Then, exploratory factor analysis (EFA) is performed according to section (except for demography section) to identify the number of constructs and to group the items for each construct. EFA on Section B (daily Lesson Plan) has yielded four constructs (Table 3). Three items are removed as they are grouped into two constructs with more or less equal loadings. Factor loadings for the remaining items are greater than 0.6.

Table 3. Results of EFA on Section B (Daily Lesson Plan) – 32 items

| Pattern Matrix<sup>a</sup> | Component 1 | Component 2 | Component 3 | Component 4 |
|-----------------------------|-------------|-------------|-------------|-------------|
| Section B Item              |             |             |             |             |
| Daily LP helps me in ...    |             |             |             |             |
| B1) organizing teaching in classroom | .867 |             |             |             |
| B2) plan teaching activities | .862 |             |             |             |
| B3) plan teaching strategy  | .767 |             |             |             |
| B4) plan learning experience| .779 |             |             |             |
| B5) control class           | .669 |             |             |             |
| B6) Manage time wisely      | .722 |             |             |             |
| B7) Prepare teaching aids   | .655 |             |             |             |
| B8) Prepare assessment tools| .886 |             |             |             |
| B9) Prepare reference for future | .832 |             |             |             |
| B10) Determine strength and weakness in teaching | .656 |             |             |             |
| B11) determine the best teaching aids to use | 0.23 | 0.34 |
| The objective characteristics that I have planned ... |             |             |             |             |
| B12) Could measure behaviour | .722 |             |             |             |
| B13) Able to predict behaviour | .883 |             |             |             |
| B14) Have criteria in explaining skills | .682 |             |             |             |
| B15) Are specific           | .604 |             |             |             |
| B16) Could explain behaviour | .781 |             |             |             |
| Teaching strategy that I have planned.... |             |             |             |             |
| B17) Involve students actively |             | .657 |             |             |
| B18) Trigger inquiry learning | .275 | .299 |             |             |
| B19) Relate theory with actual practises | .301 | .322 |             |             |
| B20) Involve higher-order thinking | .781 |             |             |             |
| B21) Involve group work     | .698 |             |             |             |
| B22) Involve all individual in the group | .657 |             |             |             |
| B23) Enjoyable learning     | .735 |             |             |             |
| B24) Improve leadership skills in students | .798 |             |             |             |
| B25) Involve idea development | .781 |             |             |             |
| B26) Encourage self-learning | .698 |             |             |             |
| The result of assessment and reflection is used in ... |             |             |             |             |
| Item                        | Component 1 | Component 2 | Component 3 | Component 4 |
|-----------------------------|-------------|-------------|-------------|-------------|
| B27) Determining improvement in students’ performance | .740        |             |             |             |
| B28) Giving written reports to parents                  | .677        |             |             |             |
| B29) Determining strength and weakness of students      | .702        | .332        | .240        |             |
| B30) Determining formality of schools                    |             |             |             | .685        |
| B31) Reflection in recording students’ performance      | .685        |             |             |             |
| B32) Reflection in recording teaching effectiveness     | .702        | .655        | .521        |             |

For the 31 items in Section C (Teaching Strategies) EFA has been yield three constructs. Items related to strategies used for acquiring the knowledge are grouped together as one factor, strategies used for applying the knowledge fall into the second factor and items for reflection on knowledge strategies fall into the third factor. However, five items (item C7, C10, C14, C15 and C19) are grouped into both constructs with more or less equal loadings and thus are removed from the final instrument. Factor loadings for the remaining items are greater than 0.6. Details of the results are presented in Table 4.

Table 4. Results of EFA on Section C (Teaching Strategy) – 31 items

| Item                        | Component 1 | Component 2 | Component 3 |
|-----------------------------|-------------|-------------|-------------|
| C1) Organize students to read selected chapters of the Quran with correct recitation | .867        |             |             |
| C2) Organize students to memorize selected chapters of the Quran with correct recitation | .862        |             |             |
| C3) Focus on learning students basic concepts                      | .767        |             |             |
| C4) Explain the ‘process of the practice’ to students               | .699        |             |             |
| C5) Ask students to explain certain concept to peers                | .669        |             |             |
| C6) Give an assignment which needs exploration                      | .722        |             |             |
| C7) Encourage students to generate their own questions               | .655        | .521        |             |
| C8) Pose a problem and encourage students to form hypothesis         | .819        |             |             |
| C9) Give assignments which require students to use the methods taught | .732        |             |             |
| C10) Encourage students to answer questions that need reference      | .656        | .544        |             |
| C11) Involve the entire class in the search for the solution to a problem | .873        |             |             |
| C12) Observe students, and ask them in their small group             | .722        |             |             |
| C13) Conduct a pre-assessment to determine early understanding of students | .883        |             |             |
| C14) Allow students to complete their homework in the classrooms     | .701        | .682        |             |
| C15) Boost students to do research                                  | .565        | .604        |             |
| C16) Encourage students to determine their basic beliefs             |             | .781        |             |
| C17) State the problem and ask students to solve it                 |             | .717        |             |
| C18) State certain skills and ask them to explain                    |             | .684        |             |
| C19) State certain action and ask students to justify                | .575        | .599        |             |
| C20) Encourage students to do formulation of the basic concepts of worship |             |             | .762        |
| C21) Encourage students to formulate 'moral values' in everyday life |             |             | .801        |
| C22) Encourage students to solve the problem referring to the selected hadith |             |             | .742        |
| C23) Give assignments so students could identify terms in forming Jawi text |             |             | .657        |
| C24) Encourage students to explain the rationale behind their ideas  |             |             | .735        |
| C25) Ask students to consider alternative explanations               |             |             | .798        |
| C26) Observe students, and ask questions while they work individually |             |             | .781        |
Results of Section D (Assessment Practises) shows that three items are found to have poor psychometric characteristic, either they have more or less equal loadings on several factors or they have poor loadings (<0.4). Thus they would be removed in the final draft of the instrument. Details of the results are shown in Table 5.

Table 5. Results of EFA Results on Section D (Assessment Practises) – 56 items
| Item | 1 | 2 | 3 | 4 | 5 |
|------|---|---|---|---|---|
| D21) I arrange test questions from easy to difficult | .745 |
| D22) I ensure that questions and options are on the same page | .623 |
| D23) I avoid including items that suggest racial, ethnic or gender biases | .714 |
| D24) I ensure that answers are arranged in random in multiple-choice test | .826 |
| D25) I only include essay questions when necessary | .811 |
| D26) I try to prepare questions that minimize guessing | .544 |
| D27) I explain the basis for scoring open-ended response items | .714 |
| D28) I try to balance easy and difficult questions | .826 |
| D29) I include on the same page the diagrams or maps needed in a particular question | .811 |
| D30) I write direction clearly | .714 |
| D31) I provide blank space for writing their names and date of testing | .826 |
| D32) I proofread all test questions and directions before printing them | .667 |
| D33) I provide enough space for each test question | .564 |
| D34) I indicate whether a separate answer sheet is used | -.322 .377 |
| D35) I give proper motivation to students before testing | -.322 .355 |
| D36) I ensure that the place is conducive for testing activities | .767 |
| D37) I see to it that cheating is not encouraged in the classroom | .565 |
| D38) I prepare rubrics before I start marking test papers | .656 |
| D39) I check whether students have enough papers and pens before starting a test | .642 |
| D40) I score test papers at random | .646 |
| D41) I ensure that I have enough test materials before I administer a test | .776 |
| D42) I provide enough space for all students to do their testing activities | .666 |
| D43) I score essay questions objectively by using rubrics | .578 |
| D44) I re-check test paper when necessary | .651 |
| D45) I follow scoring criteria strictly when marking test papers | .712 |
| D46) I ensure I have enough time to score test papers | .723 |
| D47) I provide feedback to students after every test | .887 |
| D48) I give a grade equivalent to the total score in a test | .776 |
| D49) I explain to the students how scores are derived | .656 |
| D50) Share the test results with teachers and headmasters, if necessary | .665 |
| D51) I inform parents on the students’ results | .712 |
| D52) I determine the difficulty level of each item after exam finished | .465 |
| D53) Conduct item analysis to differentiate students’ capacity | .498 |
| D54) Construct a simple bank items for each subject | .677 |
| D55) Display the names of good students to motivate their peers | .665 |
| D56) Return all examination papers which have been examined | .776 |
Reliability of the instrument

Analysis of validity using EFA by constructing for all sections in the instrument has yielded quite a high reliability measures. After all the 12 items have been removed, the remaining items are checked for reliability. The reliability values are greater than 0.67 for all constructs. Details of reliability index by construct are shown in Table 6.

Table 6: Values of Overall Cronbach’s Alpha for Each Construct

| Constructs                          | Numbers of Item Deleted | Numbers of Item Remained | Overall Cronbach’s Alpha Value |
|-------------------------------------|-------------------------|--------------------------|-------------------------------|
| Daily Lesson Plan                   |                         |                          |                               |
| i) Analysing daily Lesson Plan      | 1                       | 10                       | .863                          |
| ii) Determining Objectives in daily Lesson Plan | 0                       | 5                        | .786                          |
| iii) Organizing Learning Experiences | 2                       | 8                        | .670                          |
| iv) Assessment and Reflection       | 1                       | 5                        | .900                          |
| Teaching Strategies                 |                         |                          |                               |
| i) Strategies used for acquiring the knowledge | 3                       | 11                       | .929                          |
| ii) Strategies used for applying knowledge | 2                       | 6                        | .866                          |
| iii) Reflection on knowledge strategies | 0                       | 9                        | .890                          |
| Assessment Practises                |                         |                          |                               |
| i) Assessment planning              | 1                       | 13                       | .723                          |
| ii) Assessment item preparation     | 1                       | 19                       | .757                          |
| iii) Assessment administration and scoring | 1                       | 11                       | .801                          |
| iv) Reporting of scores and grading | 0                       | 5                        | .822                          |
| v) Assessment data utilization and evaluation | 0                       | 5                        | .767                          |
| TOTAL ITEMS                         | 12                      | 107                      |                               |

Conclusions and recommendations

Analysis of validity by EFA and internal consistency on the data show that the instrument seem to be sound and could be used to measure the implementation of curriculum, teaching strategies and assessment practices in promoting HOTs. However, results of the analyses suggest that 12 items should be removed from the instrument. There are four items from section B, five items from section C and three items from section D are removed. Thus, out of 119 items, 107 items are retained in the final draft of the instrument. The analyses yielded evidence that all the three instruments could be a useful scale to measure curriculum, teaching strategies and assessment practices amongst Islamic education teachers. The instruments from this study can be a starting point for further research. Even though the reliability and validity of the final draft of the instrument are within the acceptable range, some of the items had to be removed. Therefore, a more detailed analysis with a larger sample (>1000) using Item Response Theory (IRT) model may need to be conducted before the instrument can be finalized. The use of IRT will allow us to explore deeper into the psychometric characteristics of each item, and thus provide us with a higher level of confidence to keep only important items in the instrument.
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