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Merging Multiple Intelligences with Dialogic-based Portfolio Assessment to Expedite Iranian EFL Learners' Higher order thinking Skills

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Abstract

Controversy has not been yet resolved among second language researchers as how to enhance higher-order thinking skills (HOTS) in EFL contexts. Responding to the growing need to foster thinking skills, many foreign language educators have recently attempted to investigate the effect of diverse teaching strategies on HOTS. Yet, few studies have focused on the infusion of Gardner's theory of Multiple Intelligences (MI), dialogic teaching, and portfolio assessment in improving HOTS. Thus, the present study aimed to explore the impact of multiple intelligences-oriented dialogic-based portfolio assessment on the higher-order thinking skills of forty Iranian EFL learners studying at Jehad Daneshgahi Institute--Karaj Branch. The participants in two intact classes were assigned to a control or dialogic-based portfolio assessment (DBPA) group and an experimental or MI-oriented dialogic-based portfolio assessment (MIDBPA) group. In the experimental group, the participants' MI was initially measured through Christison's (1998) MI checklist to group learners with the same strong intelligence in one group. The multivariate analysis of ANOVA (MANOVA) indicated the superiority of MIDBPA group over the control group in the use of HOTS. The findings highlight the virtue of MI-based materials, even in dialogic-based learning environments, in enhancing HOTS. Pedagogical implications are discussed and recommendations for further research are suggested.

Keywords: portfolio assessment, higher-order thinking skills, multiple intelligences, dialogic learning

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1. Introduction

During the last three decades, language pedagogy has witnessed a growing interest in higher order thinking skills (HOTS) and the ways they can be enhanced in the classroom. The current interest in teaching thinking skills have been intensified with the advent of cognitive theory (Newmann, 1990), after which the supremacy of teacher-oriented pedagogy did not last long. The mid and late 1970s was the heyday of cognitive theory in education which seeded the plants for reawakening intelligence and cultivating higher order thinking skills in a process-based and a learner-centered environment.

This golden period of overemphasis on teaching higher order thinking skills in leaner-centered environments was punctuated by numerous books and research articles on HOTS (Lewis & Smith, 1993; Marin & Halpern, 2011; Newmann, 1990; Perkins, 1992), indicating the significance of merging HOTS with the curriculum.

A glance back through literature highlights the reasons why HOTS should be merged with the second language curriculum. First, infusing thinking skills with teaching strategies strengthens students' language abilities, achievement, and success (Perkins, 1992), because higher-order thinking skills, as defined by Lewis and Smith (1993), refer to the processes of taking new information, storing it in memory, interrelating and/or reorganizing it, and extending the information to achieve a purpose or to find possible answers in confusing conditions. Second, higher level thinking skills do not develop automatically. The conviction that as people mature, their thinking and reasoning skills naturally escalate is a myth, since adults who were not taught to think critically exhibit cognitive abilities which are not superior to the thinking processes they exploited when they were in the sixth grade (Gardner & Hatch, 1989). Third, since literacy has been recently delineated in a broader and more productive way as the ability to think and reason like a literate person (Langer, 1991), educational institutions should use approaches to literacy instruction that will ensure that higher levels of thinking become an intrinsic part of the curriculum. Forth, higher cognitive skills help students to make purposeful, self-regulatory judgments (Marin & Halpern, 2011), deal with challenges in this contemporary world where knowledge is changing so rapidly (Tsui, 2002). And, finally, higher order

thinking skills enable students to evaluate other's arguments, resolve conflicts, and reach well-reasoned decisions in complex situations (Newmann, 1990).

The importance of HOTS brings along great interest among researchers on the efficient ways of enhancing higher cognitive skills in the curriculum. Even though educators have taken great strides in their attempts to enhance the thinking skills of students, the journey has only begun in this rather unexplored area. Despite such myriad of research on higher order thinking skills, little substantiated knowledge on effective instructional approaches comes from research on higher level thinking skills since the number of studies examining the impact of specific teaching strategies are inadequate (Tsui, 2002).

To facilitate the development of HOTS, it is crucial that educational institutes concentrate on teaching students higher cognitive thinking skills (Ennis, 1989) through a major shift in instructional approaches from what to think to how to think (Tsui, 2002) in a learner centered context. To learn how to think, students must be encouraged to express their unique horizons, values, and world views in a dialogic based environment (Marchenkova, 2005). The acceptance and encouragement of multiple voices tend to enhance confidence, stimulate memory, promote higher order thinking, and encourage individual expression and style in the students. Therefore, teaching should not merely involve the transmission of subject knowledge, as in monologic and teacher-centered classrooms, but should be oriented to the development of students' capacity "to engage in the dialogues through which knowledge is constantly being constructed, deconstructed, and reconstructed" (Wegerif, 2007, p. 60).

Notably, higher-order thinking skills can be fostered in learner-centered classrooms in which students are actively involved and motivated (Marin & Halpern, 2011). Traditional teaching classrooms where individuals work individually on authoritative texts (Marchenkova, 2005) or assessment practices including end of module examinations that focus on memorization rather than the evolution of new thoughts are unlikely to encourage or higher order thinking skills (Gardner & Hatch, 1989). However, alternative assessment strategies, such as portfolio assessment, can be utilized as

alternatives to the conventional methods of testing linguistic progress in learner-centered classrooms (Hamp-Lyons & Condon, 2000).

EFL educators have embraced portfolio assessment owing to its potential benefits for learning: Portfolios provide a portrait of what students know and what they can do (Hamp-Lyons & Condon, 2000); encourage self-reflection, participation, reflective, and critical thinking (Zubizarreta & Mills, 2009); and increase self-directed learning and learner autonomy (Hamp-Lyons & Condon, 2000). Furthermore, self-assessment and reflection, inherent in writing-based portfolios, allows learners to treat themselves as others, be reflexive, and see themselves through new self-critical eyes (Qualley, 1997). In Bruner's (1979) view, such reflexive thinking that fosters one's dialogue with the self increases intellectual potency or critical thinking skills, intrinsic motivation, willingness to take risks, and memory management though experience-based learning. Therefore, the reflective part in portfolio assessment encourages students to use their reasoning skills to reexamine their previously held beliefs and so it opens the doors to creating individual meaning and critical thinking in a learner-centered constructivist environment.

More importantly, portfolios are highly merited in dialogic leaning classrooms as they facilitate the use of dialogic feedback which challenges students to share interpretations, negotiate meanings, and clarify expectations in an interactive context (Carless et al., 2011).

Dialogic feedback inspires thinking through facilitating discussions of quality in assignment tasks (Carless et al., 2011). Thus, in dialogic-based portfolio assessment classrooms, students are required to express their thoughts in their group discussions, clarify their thoughts, convince their classmates and provide reasons for the way they think. However, in his epistemic approach to teaching, Dowst (1980) sees language as a mediator between self and the world and claims that the way people think and act is influenced by their previous knowledge; that is, knowledge, thinking, behavior, and language are all inextricably linked. Reflective building of experience upon previous experiences fosters mental adaptation and thinking, meaning that engaging students in dialogues and writing activities that they can manage reasonably well might influence the way students think

and act. However, in this respect, one important issue to be considered is whether engaging students with activities compliant with their dominant intelligence would lead to an increase in the complexity of thinking or not.

Hence, to make the process of teaching as learner-centered as possible and to cater for students' dominant intelligence, Gardner's theory of multiple intelligences, which considers eight different potential pathways of intellectual ability in learning, can be merged with dialogic-based portfolios to augment the learning of HOTS since individuals learn more when instruction, assessment, and activities are in line with their dominant intelligences (Armstrong, 2003; Gardner, 1999).

Meeting the needs of each individual's strong intelligence requires teachers use various course materials that encompass all the eight intelligences in the classroom; however, only mathematical and linguistic types of intelligences have been valued in schools while the other kinds of intelligences have been ignored (Armstrong, 2003; Gardner, 1999). Besides, the conceptualization of Gardner's theory of multiple intelligences led to the call for an intelligence-fair assessment due to the fact that traditional forms of testing primarily evaluate verbal-linguistic and logical-mathematical intelligences and neglect other types of intelligences (Gardner, 1999). Alternative assessment techniques like portfolio assessments, as suggested by Gardner (1999), can incorporate different types of intelligences as they can embrace tasks that challenge and test an individual's intellectual ability in a way relevant to the person's previous experience.

As the theory of multiple intelligences claims that the learning of an individual can be improved when the dominant intelligences are utilized in the learning processes, and as each intelligence has a different developmental route and core processing operations (Gardner, 1999), it can be implied that students might be engaged in higher order thinking when activities are in line with their strong intelligence and only lower order thinking when activities match their relative weak intelligence. Therefore, when instruction, assessment, grouping, and activities are oriented toward students' dominant intelligence, it is more likely that they engage higher order thinking. Likewise, MI-oriented dialogic-based portfolio assessment can be implemented in a way to offer different ways of learning for learners

with different abilities through different writing activities designed for each type of intelligence.

The appeal of higher order thinking skills inspired a number of mainstream researchers to conduct numerous explorations to find the possible ways to embed HOTS with the curriculum; however, little research has been done concerning the effect of portfolios, especially dialogic-based portfolios, on the enhancement of higher order thinking skills. Most documented studies that focused on the effectiveness of portfolios on higher cognitive skills found portfolio assessment efficacious in enhancing thinking skills (Barak & Dori, 2009; Liu, Zhuo, & Yuan 2004; Orland-Barak, 2005; Sorrell, Brown, Mary & Kohlenberg, 1997; Wang & Wang, 2012). Sorrell et al. (1997) who utilized writing portfolios, Liu et al. (2004) who constructed a network portfolio system, and Wang and Wang (2012) who implemented an ontological approach to organizational schema of e-portfolio found portfolios effective in fostering HOTS. In another exploratory study conducted by Wade and Yarbrough (1996) on 212 teacher education students, they noted that constructing portfolios have the potential to bring to light critical thinking skills in most, but not all students based on their experiences in a community service-learning program. Similar results were obtained in another study conducted by Barak and Dori (2009) who explored the effectiveness of integration of four modes of assessment, including portfolio assessment, into a hybrid graduate course on the enhancement of HOTS. The results obtained from their study spotlighted the fruitfulness of portfolio assessment in enhancing students' ability in asking complex questions, providing solid opinions, presenting consistent arguments, and demonstrating critical thinking. In an attempt to investigate the specific quality of reflection associated with the uses of portfolios in teacher education, Orland-Barak (2005), in her paper, described and interpreted the presentation of two kinds of portfolio in two in-service courses for mentors of teachers in Israel: a process portfolio and a product portfolio. The study revealed that the two practices of portfolio construction, regardless of their differences in content, purpose, organization and the degree of intervention of the course instructors in its construction enhanced reflection.

Similarly, Iranian foreign language educators who are well acquainted with the virtues of enhancing HOTS have addressed the effect of portfolio assessment on different components of HOTS. Atai and Nikuinezhad (2006), in their study, found portfolio assessment a fruitful teaching strategy for developing students' autonomy and meta-cognitive abilities. In another study, Author (2006) concluded that portfolio assessment not enriches students' critical thinking and schema-based reading achievement.

Despite the sturdiness of dialogic teaching in enhancing higher order thinking skills in the third millennium, empirical research on the effectiveness of dialogic teaching on the improvement of higher order thinking skills is, however, sparse. To assess the effectiveness of the Socratic seminar method which is dialogic-based, Polite and Adams (1997) observed middle school students engaged in Socratic seminars, conducted focus groups, and semi structured interviews with both teachers and students. The results revealed that the dialogues are effective in promoting higher order thinking, appropriate conflict resolution strategies, and enhanced interest in learning. Relevant or real life dialogues were extremely well received by learners whereas those that placed students in metaphorical learning situations were viewed as less valuable. In another research project conducted by Daniel (2005) on the manifestations of critical thinking in pupils 10 to 12 years of age during their group discussions and dialogue, the results suggested that critical thinking appears to the extent that a 'dia-logue' is established among pupils. Besides, Frijters, Dam, and Rijlaarsdam (2008) who scrutinized the effects of dialogic and non-dialogic pedagogy on the enhancement of critical thinking skills, found dialogic learning conditions effective in the enhancement of critical thinking competencies of the students. Developing a dialogic relationship with EAP students, Benesch (1999) concluded that fostering dialogue can help students think critically and discover both their own views and the ones they have not been formerly exposed to.

Despite the bulk of research on the application of Gardner's theory of Multiple Intelligences to language teaching programs, there have been sparse studies on the relative contribution of MI theory to the enhancement of HOTS. Zobisch (2005) examined the effect of MI-based teaching on the

enhancement of critical thinking comprehension and came to the conclusion that MI instructional techniques leads to a greater critical thinking achievement. In another study, Christison (1996) attempted to apply MI Theory in TEFL Teacher Education Programs and found the integration of MI with teaching programs fruitful in fostering teachers' and learners' creative and critical thinking in second language pedagogy.

The theory of Multiple Intelligences is based on the three underpinning principles: (a) individuals are different --individual differences exists; (b) humans have different kinds of minds; and (c) education becomes most conducive if individual differences are considered (Gardner, 1999). Hence, in light of the importance of MI theory, course materials should be used in a way that encompasses all the eight intelligences in the classroom (Gardner, 1999). Nonetheless, only mathematical and linguistic types of intelligences have been emphasized in most educational systems (Gardner, 1999). That's why MI theory recommends teachers to expand their range of techniques, activities, tools, and strategies beyond the usual linguistic and logical ones largely used in most educational contexts, as the neglected intelligences might be the particular strengths of some students who had difficulties in successfully making their way through heavily linguistic schools (Armstrong, 2003).

In spite of numerous vigorous attempts by various reformers to make HOTS the primary focus of educational system, ELT curriculum in Iran has been resistant to these efforts. Most ELT textbooks used in Iran primarily deal with lower order thinking skills due to the incongruence between book contents and students' interests, needs, their everyday life and experiences (Atai & Mazlum, 2013). The importance HOTS inspired the researchers of the present study to explore how to best reinforce HOTS in a dialogic-based learning condition. Therefore, as the number of empirical research on multiple intelligence oriented dialogic-based portfolio assessment is virtually untouched and non-existent, it is praiseworthy to verify its impact through formulating the following research question:

-Does the integration of MI (multiple intelligences) with dialogic-based portfolio assessment enhance Iranian EFL learners' higher and lower order thinking skills?

2. Method

2.1 Participants and setting

The subjects, who were within the age range of 20 to 30, included 40 female Iranian EFL students studying general English in advanced levels of A1 and A2 in Jihad Daneshgahi, a private language institute in Karaj, Iran. They were randomly assigned to a control or dialogic-based portfolio assessment (DBPA) group and an experimental or MI-oriented dialogic-based portfolio assessment (MIDBPA) group. In the experimental group, the participants' MI was initially measured for the purpose of grouping learners with the same dominant intelligence type in the same group. Therefore, the participants in the MIDBPA group received activities aligned with their strong intelligence.

Conversely, as in the control group, the participants' MI was not taken into account in the selection and administration of the activities, they were grouped regardless of their dominant intelligences and were required to write about a single topic that did not necessarily match their dominant intelligence. Therefore, in each session a different type of MI-based writing topic was given to students. For example, in one session a linguistic-based and in another session a spatial-based writing topic was practiced.

2.2 Instruments

The instruments used to collect data included:

1) Mary Ann Christison's (1999) Multiple Intelligences checklist was initially given to the participants in the experimental group to identify their dominant intelligences and to group them accordingly. The MI checklist which was designed based on Gardner's theory of Multiple Intelligences covered eight different intelligences including verbal - linguistic, logical- mathematical, spatial-visual, bodily - kinesthetic, musical-rhythmic, naturalistic, interpersonal and intrapersonal intelligence. Each dimension of intelligence is gauged through 6 items.

The section with the highest score was regarded as the test taker's dominant intelligence type. Those participants with similar dominant intelligences were grouped to work on the tasks together.

2) To ascertain the initial homogeneity of the participants in higher and lower order thinking skills, a writing test was used. The same writing test was used as a post-test for measuring HOTS and LOTS at the end of the study.

3) Interactive cover sheets (ICS) were used to make instruction more dialogic through enhancing the dialogue between the teacher and the student. Such sheets, which include information about particular aspects of writing students wish to receive feedback, make the teacher's feedback directly aimed at answering the students' inquiries about their work.

4) The researchers designed self-assessment checklists to encourage learners to reflect on their strengths and weaknesses in order to rate their writing assignments on a scale of 1 to 5, with 1 representing poor and 5 representing excellent. They were also required to provide reasons for the given scores. As the results of the self-assessment checklists were not taken into account in this study, the researchers did not gauge the reliability and validity of the instrument.

5) A higher order thinking skills rubric developed by Legare (2002) was used in this study (see Appendix). This rubric was designed and validated based on key theorists' and researchers 'definitions of HOTS together. For instance, judgment and interpretation construct a category of HOTS since, based on key scholars definition, they refer to abilities of identifying conclusions, reasons and assumptions (Ennis, 1989); developing and defending a position on an issue (Ennis, 1989); defining terms in a way appropriate for the context (Ennis, 1989); and making contributions relevant to prior discussion (Newmann, 1990). Consequently, derived from such definitions, any statement which seeks to defend a position taken on an issue, connects to and furthers the discussion, and defines terms in a way appropriate for the context can be indicator of judgment and interpretation, a subcomponent of HOTS.

The researchers piloted the framework in Fall 2012 on 20 female Iranian EFL students studying English in the advanced level of A2 in Jehad Daneshgahi Institute—Karaj Branch. To ensure the accuracy of the higher-order thinking skills rating rubric, an inter-rater reliability analysis using Pearson correlation was performed to determine consistency among raters. The inter-rater reliability indices for categories of HOTS and LOTS (JI, MP, IM, ST, and VR) were found to be.796, .946, .848, .851, and .930, respectively, indicating a significant agreement between the two raters.

3. Materials

Two types of materials were employed in this study: The first and the main course book used in the classes tilted "*Summit 2*" from "Top Notch" series (Saslow & Ascher, 2007) and the second teaching material, which was added to the main course materials titled "*Multiple Intelligences: the Thematic Approach*" by R.I. C. Publications (2004). The book, designed based on the theory of multiple intelligences, includes a list of MI-oriented writing tasks. Although the general writing assignment topics were the same in both groups, the assignments only matched students' dominant MI in the MI-oriented dialogic- based portfolio assessment group. For instance, for the topic endangered species, the students whose inclined intelligence was linguistic were required to write about whether zoos or animals in captivity help or hinder endangered animals. The subjects strong in special, naturalist, and mathematical intelligence were required to rank the locations in Iran in which the endangered species can be persevered, write about different types of environmental problems that have led to endangered species, and write similarities and differences among endangered species, respectively.

4. Procedure

The participants in two intact classes were randomly assigned to experimental and control groups. The students in the experimental group received MI-oriented dialogic-based portfolio assessment (MIDBPA) while the subjects in the control group were exposed to a dialogic-based portfolio assessment (DBPA). In the experimental group, Christison's (1999) MI checklist was initially used to determine the students' strong intelligence in

order to group those with the same dominant intelligence type in the same group. The data were also used to select MI-oriented writing topics in the experimental group. Yet, the students in the control group or dialogic- based portfolio assessment received activities that were not compatible with their inclined intelligences. That is to say, the selection of activities and grouping were performed haphazardly without considering the strong intelligences. For this reason, the participants received a different type of MI-based writing topic each session, such as a linguistic-based, a spatial-based, etc.

Although each term in the Jehad Daneshgahi institute covered 20 sessions, 1.5 hours each, the number of treatment sessions along with the ones for pretest and post-test were 11. The required time for constructing each portfolio, which required 2 sessions to be completed, was the same in both groups: 10 minutes for brainstorming and discussion; 30-35 minutes for writing argumentative paragraphs; 35 minutes for reflection, revision, self/peer assessment and feedback. Consequently, the number of writing-based portfolio assignments was only 4 due to the fact that they required time to be constantly expanded, reviewed, assessed, cleaned, and stored and that they were added to their main course materials.

In the control group, the teacher, who was among the male experienced teachers holding M.A in TEFL in Jehad Daneshgahi Institutes—Karaj branch, grouped the participants, each containing 5 subjects. In each session, after discussing about the writing topic in groups, the participants were asked to write an argumentative paragraph individually. Also, interactive cover sheets were attached to the front of the student's assignments in the control group. Each participant had to write about the particular aspect of writing assignment on which he/she would like to receive feedback. Then, writing assignments were collected to be evaluated by the teacher. In another session, each participant was required to think about the teacher's evaluation, revise the draft based on teacher's comments, and then return the writing assignment to the teacher.

Furthermore, having evaluated the assignments, the teacher arbitrarily selected 1 or 2 uncorrected papers to be displayed on the visualizer and asked students to interactively discuss the case with peers in their group. After group discussions, the teacher encouraged and required the students to

ask questions, criticize, or make suggestions about the writing displayed on the visualizer. The teacher as a facilitator used questioning method to respond to students questions in order to force them to think.

The same procedures were followed in the experimental group except for the initial identification and consideration of MI in the experimental group (MIDBPA). In the experimental group, the participants with the same dominant intelligence were grouped together and were given a writing topic congruent with their intelligence type. For instance, for the topic *endangered species*, those with high linguistic intelligence were required to write about whether zoos or animals in captivity help or hinder endangered animals. The participants with high special, naturalist, and mathematical intelligence were asked to rank the locations in Iran in which the endangered species can be persevered, write about different types of environmental problems that have led to endangered species, and write similarities and differences among endangered species, respectively.

5. Results

The main concern of this study was to explore the effect of merging multiple intelligence-oriented activities with dialogic-based portfolio assessment on the enhancement of Iranian EFL learners' higher and lower order thinking skills. Two classes, comprising a sum of 40 students, were randomly assigned to a control or dialogic-based portfolio assessment (DBPA) group and an experimental group, who received MI-oriented dialogic-based portfolio assessment (MIDBPA). In the experimental group, the participants' dominant MI was initially used as a basis for grouping learners and for presenting activities compatible with their inclined intelligences.

To answer the research question that addressed the probable impact of MI-oriented dialogic-based portfolio assessment on the higher and lower thinking skills of Iranian EFL learners in writing, the researchers first used Pearson correlations to ensure the inter-rater reliability for the two raters on pretest and post test of categories of HOTS and LOTS. The inter-rater reliability indices on the categories of JI, MP, IM, ST, and VR, in pretest were .86, .77, .80, .86, and .89 and in the posttest were .88, .93, .88, .88, and

.88 respectively (P < .05). Therefore, significant agreements were witnessed between the two raters.

Since the present data were analyzed through the MANOVA, the assumption of normality should be checked. As Table 1 illustrates, the ratios of skewness and kurtosis over their respective standard errors were within the ranges of +/- 1.96. Thus, it can be concluded that the assumption of normality was met.

Table 1. Testing normality assumption of variances of groups in pretest and posttest of higher and lower order thinking skills

Group		N	Skewness			Kurtosis		
		Statistic	Statistic	Std. Error	Ratio	Statistic	Std. Error	Ratio
DBPA	HOTPRETEST	20	.026	.512	0.05	-.809	.992	-0.82
	NONHOTPRETEST	20	.530	.512	1.04	-.870	.992	-0.88
	HOTPOSTTEST	20	-.808	.512	-1.58	.015	.992	0.02
	NONHOTPOSTTEST	20	-.331	.512	-0.65	-.239	.992	-0.24
	Valid N (listwise)	20						
MIDBPA	HOTPRETEST	20	.257	.512	0.50	-1.168	.992	-1.18
	NONHOTPRETEST	20	.786	.512	1.54	1.189	.992	1.20
	HOTPOSTTEST	20	.337	.512	0.66	.338	.992	0.34
	NONHOTPOSTTEST	20	-.095	.512	-0.19	-.570	.992	-0.57
	Valid N (listwise)	20						

To ascertain the homogeneity of the experimental and control groups on the pretests of higher and lower order thinking skills, the statistical techniques of descriptive statistics (Table 2) and MANOVA (Table 3) were utilized.

Table 2. Descriptive statistics: Pretest of higher and lower order thinking skills

HOT's	Group	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Higher Order	DBPA	17.100	.500	16.087	18.113
	MIDBPA	17.350	.500	16.337	18.363
Lower Order	DBPA	23.100	1.101	20.871	25.329
	MI DBPA	22.250	1.101	20.021	24.479

As Table 2 indicates, the experimental group (MI-oriented dialogic-based portfolio assessment) and the control group (dialogic-based portfolio assessment) show slight differences in the means scores on higher order (M = 17.35 vs. 17.10) and lower order (M = 22.25 vs. 23.10) thinking skills. However, to probe the significance of groups' differences, the researchers ran a multivariate ANOVA (MANCOVA) to ascertain the groups' homogeneity in terms of the entry knowledge.

Table 3. Multivariate ANOVA on the pretest of higher and lower order thinking skills

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Intercept	Pillai's Trace	.992	2290.157	2	37	.000	.992
	Wilks' Lambda	.008	2290.157	2	37	.000	.992
	Hotelling's Trace	123.792	2290.157	2	37	.000	.992
	Roy's Largest Root	123.792	2290.157	2	37	.000	.992
Group	Pillai's Trace	.009	.161	2	37	.852	.009
	Wilks' Lambda	.991	.161	2	37	.852	.009
	Hotelling's Trace	.009	.161	2	37	.852	.009
	Roy's Largest Root	.009	.161	2	37	.852	.009

As displayed in Table 3, there are not any significant differences between the means of the experimental and control groups on the pretest of higher and lower order thinking skills, as $F(2, 37) = .161$, $P > .05$, Partial $\eta^2 = .009$, it represents a weak effect size. Based on these results it can be concluded that the multiple intelligence-oriented dialogic-based portfolio assessment and dialogic-based portfolio assessment groups were homogenous in terms of the of the entry knowledge prior to the main study.

As the assumption of homogeneity on the pretests of higher order and lower order thinking skills has been met, the researchers submitted the indices obtained from posttests of HOTS and LOTS to multivariate MANOVA tests. Table 4 illustrates the descriptive statistics.

Table 4. Descriptive statistics: Groups' posttest of higher and lower order thinking

HOT's	Group	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Higher Order	DBPA	17.850	.590	16.655	19.045
	MIDBPA	22.700	.590	21.505	23.895
Lower Order	DBPA	28.250	1.206	25.809	30.691
	MIDBPA	16.950	1.206	14.509	19.391

The results of descriptive statistics showed noticeable differences in the mean scores of HOTS and LOTS in both groups. The experimental or multiple-intelligence oriented dialogic –based portfolio assessment group achieved higher mean score in higher order thinking skills (22.7) than the control or dialogic-based portfolio assessment group (17.85), while the control group's mean score in lower order thinking skills (28.25) was higher than the experimental group (16.95). To compare the significance of the groups' mean scores on higher and lower thinking skills in post-test, a multivariate analysis of ANOVA was run, the results of which are presented in Table 5.

Table 5. Multivariate ANOVA on the groups' posttest of higher and lower order thinking skills

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Intercept	Pillai's Trace	.995	3742.981	2	37	.000	.995
	Wilks' Lambda	.005	3742.981	2	37	.000	.995
	Hotelling's Trace	202.323	3742.981	2	37	.000	.995
	Roy's Largest Root	202.323	3742.981	2	37	.000	.995
Group	Pillai's Trace	.561	23.594	2	37	.000	.561
	Wilks' Lambda	.439	23.594	2	37	.000	.561
	Hotelling's Trace	1.275	23.594	2	37	.000	.561
	Roy's Largest Root	1.275	23.594	2	37	.000	.561

As displayed in Table 5, there are significant differences between the means of the experimental and control groups on the posttest of higher and lower thinking skills, as F (2, 37) = 23.59, P < .05, Partial η^2 = .56, it represents a large effect size. Therefore, based on these results, it can be concluded that the research question was answered positively indicating the positive impact of dialogic-based portfolio assessment and multiple intelligence-oriented dialogic-based portfolio assessment on Iranian EFL learners' higher and lower order thinking skills.

Table 6. Tests of between-subjects effects

Source	Dependent Variable	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Group	DBPA	235.225	1	235.225	33.762	.000	.470
	MIDBPAF	1276.900	1	1276.900	43.923	.000	.536
Error	DBPA	264.750	38	6.967			
	MIDBPA	1104.700	38	29.071			
Total	DBPAF	16943.000	40				
	MIDBPA	22812.000	40				

Moreover, the results of between-subjects effects (Table 6) illustrate that there are significant differences between the means of the experimental and control groups in higher-order and lower-order thinking skills on the posttest, as F (1, 38) = 33.76, P < .05, Partial η^2 = .47 (it represents a large effect size). Based on these results, it can be concluded that the difference between the means of the MIDBPA (M = 22.70) and the DBPA (M = 17.85) groups on higher-order thinking skills were significant. Accordingly, the experimental group performed better in HOTS.

Likewise, as Table 6 shows, the difference between the means of the experimental (M=16.95) and control (M=28.25) groups on the post test of lower-order thinking skills are significant, as F (1, 38) = 43.92, P < .05, Partial η^2 = .53, it represents a large effect size. The results were indicative of more instances of lower order thinking skills on the posttest in the control group.

6. Discussion

The results emerging from this study indicated that the integration of Multiple Intelligences with portfolio assessment, even in a dialogic based condition, strengthens the enhancement of higher order thinking skills in writing.

Meaningful learning is a prerequisite to higher-order thinking that occurs when an individual takes new information, links new knowledge to relevant concepts in the long-term memory, and then extends this information to achieve a purpose or to find possible answers in confusing conditions whilst rote learning results in lower-order thinking skills when there is little or no integration of the new knowledge with the previous one (Lewis & Smith, 1993; Newmann, 1990). However, in order to enhance meaningful learning, it is vital that the learners have prior and relevant knowledge, the course materials be meaningful by themselves, and the learners intentionally decide to learn meaningfully (Novak & Cañas, 2006). Therefore, the findings of this study validate Lewis and Smith's (1993), Novak and Cañas's (2006), and Newmann's (1990) ideas since orienting materials toward the strong intelligence enriches learners' prior knowledge, willingness to consciously learn meaningfully, and higher order thinking skills.

At the heart of a multiple intelligence-oriented dialogic-based portfolio assessment lies the processes of self-assessment, evaluation, reflection, and revision of MI-based writing assignments which contributed to the enhancement of higher-level thinking skills, supporting Hayes and Flower's (1980) claim that thinking and writing are interlined and that drafting and revision in writing help students to manage cognitive overload and to manipulate information in the memory to learn meaningfully. Therefore, as writing and thinking are interlinked, when individuals are engaged in writing assignments that match their dominant MI, they can better use their reasoning and thinking skills to evaluate which resources in the long-term memory to employ. The reason is that the integration of MI-based writing topics reduces the cognitive overload due to less unrelated facts in the working memory while processing information, facilitating the processes of relating and organizing the new information to the existing.

Dowst (1980), who sees knowledge, thinking, behavior, and language all inextricably linked, claims that reflective building of experience upon previous experiences fosters mental adaptation and thinking. Therefore, the findings of the present study confirm Dowst's (1980) assertion that engaging

students in activities that they can manage reasonably well enhances thinking skills, since the application of MI-based writing topics almost guarantees learners' ability in performing the task at hand and the relevant background knowledge to be able to think critically.

Moreover, the processes of self-assessment, revision, and reflection, as Bruner (1979) maintains, foster one's dialogue with self leading to the enhancement of intellectual potency or critical thinking skills, intrinsic motivation, willingness to take risks, and memory conservation though experience-based learning. Hence, in line with Bruner's (1979) claim, engaging learners in MI-oriented writing assignments in a dialogic-based portfolio classroom promotes one's dialogue with self as the utilization of MI-based tasks ensures the existence of more relevant background knowledge in the long-term memory to enable the individuals to use their reasoning and thinking skills in self-dialogues. Therefore, if teachers provide course materials aligned with students' dominant intelligences, the learning experience might be more appealing and motivating for students, encouraging them to take risks and employ reasoning skills to select the best solution to complete the task.

Additionally, through self-assessment, reflection, revision, and dialogic feedback in portfolio assessment, the instruction becomes more humanized since it values the students and allows not only teachers but also peers and the learners themselves to think and evaluate the writing assignments. Utilizing MI-based activities makes the curriculum more humanized, personalized, and learner-centered, supporting Marin and Halpern's (2011), Paul's (1985), and Tsui's (2002) claim that a learner-centered pedagogy builds up the enhancement of higher cognitive skills.

The findings are in line with the very few empirical studies investigating the impact of MI on enhancing English language learners' higher-order thinking skills. In congruence with the findings of the present study, Zobisch (2005) found presenting course materials through a variety of MI instructional techniques fruitful in enhancing critical thinking. Similarly, Christison (1996) who utilized the theory of multiple intelligences in TEFL Teacher Education Programs asserted that the amalgamation of MI Theory with instruction made teachers and learners think creatively and critically.

The findings of the study are congruent with the results of Walker's (1987) who came to the conclusion that domain-specific and background knowledge are much more important in determining good thinking and

performance on a given task than the general intelligence. In other words, expert low-IQ students exhibit more complex reasoning skills than the novice students with high general intelligence. Likewise, Ceci and Liker (1986) found that the experts with low levels of intellectual functioning could make complex classifications and reasoning processes when the stimuli were very familiar to them, meaning that learner may think at higher levels when their interests and dominant MI are taken into consideration. Consequently, considering a person's strength in one domain of MI which is totally dependent on the previous background knowledge, familiarity, and experience (Gardner & Hatch, 1989), facilitates the use of higher order thinking skills. Therefore, engaging students with tasks in line with their inclined intelligence type may boost the occurrence of higher cognitive skills as individuals have gained more critical information in the domain of their interest, supporting Perkins' (1992) claim that knowledge, undoubtedly, enhances thinking skills. In other words, working in the area of inclined intelligence leads to deeper understanding of knowledge and subsequently improves HOTS.

In addition, as conscious thinking occurs in working memory with its limited capacity (Gagné, Yekovich, & Yekovich, 1993), and is a prerequisite to meaningful learning (Novak & Cañas, 2006) and higher order thinking skills (Lewis & Smith, 1993; Newmann, 1990), different instructional strategies that prolong information in the working memory should be used. That is, the use of instructional strategies that allow learners to think about information in the working memory makes the transfer of information into long-term memory easier. Therefore, the application of MI-based materials might prolong information in the working memory, since when the activities are in line with the dominant intelligence type, the experience would be more appealing to students, committing and encouraging them to actively and eagerly process the information and to employ different learning strategies to complete the task at hand. Therefore, it can be implied that the integration of multiple intelligences with dialogic-based portfolio assessments can reinforce the development of higher order thinking skills.

When interpreting a body of information, individuals' previous experience, assumptions and bias play a crucial role in their compiling reasons and evidence to support opinions or examining an issue thoroughly from multiple points of view. This leads to variations in the development and functioning of different mental skills from one domain to the other, which, as Fischer (1980) in his dynamic skill theory argued, can be

attributed to differences in the previous experience with different domains and the support they receive when interacting with the various domains. Prominently, Fischer posited that an individual's true level, or the level of his potential, can only be determined under conditions of maximum familiarity and scaffolding. In other words, an individual's earlier steps and familiarity are self-scaffolding in that they provide the necessary support for performance in later, more complex steps. Therefore, once the performance in one step of the process of learning and thinking is poor, performance in subsequent steps is also likely to be poor. Hence, the findings of this study support Fischer's dynamic skill theory. Engaging pupils in activities aligned with their dominant intelligences increases the occurrence of self-scaffolding. For example, if students in a classroom are given a kinesthetic-based problem fraught with uncertainties, the individuals with low kinesthetic intelligence will face more difficulties in solving the problem, making the performance in other higher steps weaker. In this case, due to incongruence between the type of activity and dominant intelligence, the problem is less familiar and so the thinker cannot not adequately explore relevant information from multiple points of view; as a result, the thinker's attempts to establish priorities for making conclusions and incorporate strategies for solving the problem are also likely to be weak.

The results of this study are reasonably consistent with the claims of MI theory. The use of MI-oriented dialogic-based portfolio assessment helped the participants in the present study to achieve higher degrees of HOTS. However, the facilitative role of the stages of individual and group work discussion, revision, reflection, and peer/self assessment in portfolios in enhancing HOTS should not be ignored. More importantly, it should be borne in mind that the idea of helping students to become good independent thinkers should be accepted by the educational system or society (Paul, 1985). Thus, to make HOTS the primary educational goal of educational system in Iran, such general consensus is needed; otherwise, all efforts to teach higher level thinking skills will only bring limited success.

Due to Iran's policy and religion, Iranian EFL curriculum and practice utilize the textbooks written by experts in material developers who should be committed, and loyal to Islam and Islamic revolution (Atai & Mazlum, 2013). Therefore, as the prescribed textbooks are not based on any needs analysis research, students' strong intelligences, including musical intelligence, are ignored. Hence, as the results of this study revealed, public schools and universities can almost satisfy students' ever-increasing need to

develop higher-order thinking skills through utilizing an MI-oriented dialogic-based portfolio assessment.

7. Conclusion

In this study, the researchers have investigated the impact of merging multiple intelligence-oriented activities with dialogic-based portfolio assessment on the Iranian EFL learners' enhancement of higher order thinking skills in writing. The integration of MI-oriented activities with dialogic-based portfolio assessment, as the results of this study revealed, helped students to develop higher order thinking skills.

The findings have pedagogical implications for educators, English teachers, and course designers. It seems imperative to take into account learners' dominant intelligences before deciding on a particular type of material in a learner-centered dialogic based classroom to expedite the learning of higher order thinking skills. The findings suggest that engaging students in an area of intellectual strength results in more instances of higher order thinking skills and less evidences of lower order thinking in writing assignments than the time they are involved in an area of relative weakness. Therefore, it seems essential that teachers consciously apply a staple of different MI-based course materials together to reinforce students' learning of higher-order thinking skills. Besides, the merging of MI with dialogic-based portfolio assessment, at the core of which lies cooperative, reflective, and questioning techniques, at earlier stages of language learning may prove effective in not only habituating them to think critically, reflectively, and creatively but also in dealing with the challenges they may face in their everyday life, education, and jobs. Also, as not all students learn and think in the same manner, materials developers are recommended to incorporate MI in developing course books.

Further investigations need to be conducted to identify strengths and weaknesses of such infusion approach in terms of socio-cultural characteristics of Iranian students. It is also recommended to replicate the study to verify the effect of age and gender. Moreover, more investigations are required to scrutinize the effect of such MI based materials in a dialogic based environment on a broader range of talents even on those who are at risk for school failure.

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Appendix

Legare's (2002, p. 310) higher order thinking skills rubric.

CT Categories	Any statement which ...	Key words	Nud*ist codes
Judgement and interpretation (JI)	**Defines** terms in a way appropriate for the context	May use own terms or paraphrase a dictionary definition. Intention is to provide a common understanding of terms.	(1 1)
	Identifies **reasons** and **assumptions**	Establishes the rationale of the context. Explains the reasons why a statement is made. Establishes a common basis for understanding	(1 2)
	Makes connection between ideas and/or facts	Bridges two worlds or two ideas. Reaches "widely". Beyond a "toddler's" understanding.	(1 3)
	Evaluates, assesses ideas, facts, or statements	Student is weighing or pondering.	(1 4)
	Seeks **to support (to defend)** a position taken on an issue	Purpose may be either explanatory or illustrative. Uses examples or illustrations. In-depth.	(1 5)
Multiple perspectives (MP)	**Challenges** a conclusion or a previously made point	Goes beyond "idées reçues". Challenges conventional ideas. Position (or angle) is based on reason.	(2 1)
	Suggests an **alternative approach**; looks at **the other side** of an issue	Looks at the other side: Statement that there is another side.	(2 2 1)
		Suggests alternative approach: An elaboration about the other side. Discussion beyond mere statement. Looking for solution.	(2 2 2)
	Assumes a **questioner's** role and/ or considers the viewer's* perspective	Questioner's role: Uses a questioning strategy in the essay. Distancing from the role of "writer".	(2 3 1)
		Viewer's perspective: Considers the viewer's standpoint. Empathy and understanding.	(2 3 2)
CT Categories	**Any statement which ...**	**Key words**	**Nud*ist codes**
Imposing meaning (IM)	Recognizes that alternative approaches have different impacts (consequences)	Considers consequences or causes and effect. Somewhat evaluative but more complex than JI4.	(3 1)
	Offers a **prediction**, an **hypothesis** or a **recommendation**	Prediction or hypothesis: A projection in time	(3 2 1)
		Offers a recommendation or solution to a problem	(3 2 2)
	Summarizes point of views	May be in conclusion or at the end of a paragraph or a section. A shorter reformulation of facts and arguments	(3 3)
	States a conclusion	Ends a paragraph a section or the essay.	(3 4)
	Generates new ideas and/or **novel** understanding (original thinking)	Demonstration of a novel understanding (original thinking). "Creates" a new idea. Light!	(3 5)
Metacognition	Expression of an awareness of thinking processes or understanding		(4)
Statements	Declarative or factual sentences	Def.: "To make something clear". E.g. Motorcycles is a means of transportation A list of facts. May use bullets. Might be "historical info." TIP: Student is probably using a source of information.	(5 1)
	Opinion (position taken on an issue)	Position taken on an issue. Based on reason.	(5 2)
	Belief (conviction)	Expression of a conviction. Statement not based on reason.	(5 3)
Varia	Not a sentence	Unit does not constitute a proper sentence (syntax or punctuation issues)	(6 1)
	Meaning: The sentence does not make sense	Impossible to extrapolate the sense.	(6 2)
	Organisational	All titles and subtitles	(6 3)
	Procedural sentences	Information given to the reader about the organisation of the text. E.g.: "In the next section...")	(6 4)
	Direct quotes	Citation in quotation marks.	(6 5)

*Please refer to task instructions