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Investigating the Washback Effect of Online Formative Assessment (OFA) During the COVID-19 Pandemic: A Case of Perceptual Mismatches Between Prospective Teachers and Teacher Educators

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This study aimed to explore the washback effects of implementing online formative assessment (OFA) in Iranian Teacher Education Universities. To this end, a sample of 227 prospective teachers majoring in Teaching English as a Foreign Language and 21 teacher educators were randomly selected. In an explanatory sequential design, their perceptions of the washback effects of the OFA were measured via a researcher-made questionnaire and a semi-structured interview. The results of the quantitative phase of the study showed that the washback effects of the new assessment modality were mainly negative. The results also revealed some perceptual mismatches between the prospective teachers and their educators. The qualitative results confirmed those observed in the quantitative data while shedding light on the origin of those areas of mismatch. It can be concluded that teacher educators have been unable to take full advantage of OFA in education.

Keywords: washback effect, online formative assessment (OFA), perceptual mismatches, prospective teachers, teacher educators

Introduction

Although traditional face-to-face education has always been the dominant modality in nearly all educational settings, online education has recently risen in popularity due to the COVID-19 pandemic. The pandemic has become a critical challenge across many sectors, one of which is higher education in which both individuals and institutions have been affected by some immediate and long-term significant impacts (UNESCO IESALC, 2020). In fact, the Covid-19 pandemic has hit hard and interrupted education in several countries worldwide (Bozkurt et al., 2020). Due to the temporary cessation of face-to-face education, some universities have experienced an unprecedented

transition to various forms of online education (Peimani & Kamalipour, 2021). Definitely, this new mode of delivery entailed some sort of innovation or modification in instructional materials, teaching methods, and assessment techniques.

In line with developing a new adaptive educational framework in response to the new circumstances, assessment underwent a transformation from summative assessment into online formative assessment (OFA), which is defined as “as the application of formative assessment within learning online and blended settings” (Gikandi et al., 2011, p. 2337). Summative assessment, which measures learners’ achievement at the end of the course for

evaluative purposes, is mainly employed in face-to-face education, while OFA is often the preferred assessment mode in online education (Perera-Diltz & Moe, 2014). The move to online education and the subsequent transition to OFA due to the COVID-19 lockdown has raised some questions about the qualitative and quantitative effects of this new assessment modality on the participants, processes, and products of the programs. In the literature, this phenomenon is known as the washback effect. In other words, the washback effect means that any form of assessment may have various positive or negative effects on educational systems, teaching and learning processes, and the various stakeholders (Andrews, 2004).

In the context of the study, teacher education universities in Iran, online education began to proliferate in early 2020 in the complete absence of physical access to on-campus learning environments. When it occurred, the teacher educators redefined their course syllabuses including their teaching and assessment procedures to align them to the new requirements. The teacher educators were required to replace summative assessments with OFAs hoping that this fertile ground would bring about positive washback effects on the prospective teachers' achievement. Investigating the positive and negative effects of such a sudden and dramatic transformation seems to be among the untouched areas of online education. The literature shows that scant efforts have been made to study the washback effects in alternative assessments throughout the world (Hung, 2012) and in the context of the study.

Review of the Related Literature

According to the UN report in August, 2020, “the COVID-19 pandemic has created the largest disruption of education systems in history, affecting nearly 1.6 billion learners in more than 190 countries” (p. 2). The pandemic has forcefully closed many learning spaces and shifted the mode of education from traditional lectures in auditoriums to “emergency remote education” (Bozkurt et al. 2020, p. 2), in cyberspace. In higher education, this rapid and obligatory transition to remote education in the light of the Coronavirus crisis entailed some sort of digital modification of education across all components such

as learning materials, teaching methods, instructional activities, and assessment tools.

Assessment is one of the components which needs reform implementation in online learning contexts (Vonderwell et al., 2007). This component is described as “the heart of the student experience” in every curriculum and is “probably the single biggest influence on how students approach their learning” (Rust et al., 2005, p. 231). This profound influence can be attributed to the effect of assessment on teaching and learning which is referred to as the “washback effect” (Hughes, 2003) in the literature. This effect can operate in either positive or negative direction: it is beneficial when assessment enhances teaching and learning, and it is deleterious when it fails to reflect the learning principles or hinders meeting course objectives.

The washback research dates to the early 1990s when the first attempts were made to establish its theoretical framework. The first step was taken by Alderson and Wall (1993) who developed a framework entitled Fifteen Washback Hypotheses. In a seminal paper, entitled “Does Washback Exist?”, they proposed 15 hypotheses to indicate different areas of teaching and learning, including the content, methods, rate, sequence, degree, and depth that are generally affected by washback (Cheng et al., 2004). They also asked “researchers to take account of findings in the research literature in at least two areas: (a) motivation and performance and (b) innovation and change in the educational settings” (Cheng & Curtis, 2004, p. 13). Later conceptual models of washback indicated the complex nature of this phenomenon. For example, in a model proposed by Green (2007), washback is defined as a relative concept which is a function of intensity and direction. When direction is concerned, test stakes and participants' characteristics may influence test method and test preparation. When it comes to washback intensity, the participants' perceptions of test stakes and test difficulty may result in positive or negative consequences.

In line with Alderson and Wall's (1993) second area of further research, pre-planned innovations or unwanted changes in educational settings have resulted in some modifications in assessment procedures which, in turn, have provided fertile areas of washback studies. The recently forced transition to online education due to the COVID-19 has made many

teachers and educators switch from summative assessment to formative assessment (Antonova & Tyrkheeva, 2021; Bozkurt et al., 2020). Meanwhile, the convergence of formative assessment with technological innovations such as social media and Learning Management System (LMS) platforms has made OFA the most prevalent assessment procedure in the current crisis.

Nowadays, OFA has paved the way for various forms of alternative assessments such as written assignments, projects, presentations, fieldwork, take-home exams, audio/video-based uploads, simulation-based tasks, and e-portfolio. But for some teachers and educators, OFA means transferring assessment practices from face-to-face education to online learning environments (Beebe et al., 2010), a misconception that views online education as a matter of technology rather than pedagogy. To dispel the misconception, Gikandi et al. (2011) has raised some significant issues such as validity, reliability, and dishonesty in the realm of OFA.

Validity in OFA “depends on how far the interpretation and use of the assessment actually leads to further learning” (Hargreaves, 2007, p. 186). It is a function of “authenticity of assessment activities, effective formative feedback, multidimensional perspectives, and learner support” (Gikandi et al., 2011, p. 2338). Reliability as the second issue in OFA is the degree to which what is assessed is dependable or sufficient to measure the desired learning outcomes. In fact, online assessment is reliable if it provides evidence of learning (Gikandi et al., 2011), if it gives learners multiple opportunities to demonstrate their learning (Gaytan & McEwen, 2007), and if learning goals and rubrics are clearly defined, interpreted, and shared (Vonderwell et al., 2007). The third major issue, dishonesty, deals with assessment security which focuses on securing assessment against academic misconducts such as plagiarism, collusion, and contract cheating (Holden, et al., 2021).

In addition to the above-mentioned concerns, the unplanned transition to OFA in educational settings has raised other concerns. On the one hand, both teachers and learners may adopt negative attitudes and exhibit behaviors ranging from concern to outright opposition when the new assessment modality is implemented. This issue has been incorporated in Green's (2007) model which defines washback

intensity as a function of test-takers' perceptions of a test. On the other hand, there might be some discrepancies between teachers' intentions and learners' interpretations of the new assessment practices especially in the absence of face-to-face interaction between them. There have always been various perceptual mismatches between teachers and students, and the two groups may have different attitudes toward the innovative mode of evaluation. Since “perceptual mismatches are unavoidable, identifiable and manageable” (Kumaravadivelu, 2003, p. 90), identifying the areas of mismatches between teachers and learners regarding the effects of OFA is of vital importance.

The review of literature on formative assessment shows that so many studies have investigated various dimensions of this form of assessment. Formative assessment has washback effects on students' academic achievement (McLaughlin & Yan, 2017), forms positive attitudes toward learning materials and future learning (Lawton et al., 2012), reduces the level of anxiety among students (Cassady & Gridley, 2005), and increases interactivity between students and the educators (Vonderwell et al., 2007). But in comparison to formative assessment in face-to-face mode, OFA has received much less attention (Gikandi et al., 2011; McLaughlin & Yan, 2017). Recently, there has been an increase in studies on OFA most probably due to the compulsory remote education during the COVID-19 crisis.

The washback effects of OFA have been indicated in some empirical studies. It has been indicated that OFA leads to an increase in students' learning and achievement. A study by McSweeney and Weiss in 2003 showed that using OFA had a significant effect on learners' level of achievement. Another study carried out by Angus and Watson (2009) also indicated that learners who took OFAs during the course of instruction had better achievement at the end of the course. OFA has also been empirically studied to see how it affects learners' motivation. In 2020, González-Gómez et al. conducted a study which investigated the effect of an OFA tool on 311 university students' motivation. The findings of the study indicated that the tool had a significant effect on the participants' level of motivation. Finally, learners' perceptions towards the usefulness of OFA has also been studied by Elmuttalut in 2014. His findings indicated that the learners had positive attitudes toward this assessment modality.

As evident in all these studies, OFA has been used as an *option in online education*. To the best of authors' knowledge, no study has been conducted to investigate the washback effects of OFA as an *obligation in the emergency remote education* of COVID-19 crisis. Moreover, no study has been carried out to determine the possible attitudinal mismatches between teachers and learners regarding the nature of the washback effects of this assessment procedure. Therefore, the current study aimed to investigate the nature of the washback effect of OFA and the perceptual mismatches between teacher educators and prospective teachers in teacher education universities in Iran. More specifically, the study aimed to answer the following questions:

1. What are the positive or negative washback effects of OFA in the context of teacher education universities in Iran?
2. Are there any significant perceptual mismatches between teacher educators and prospective teachers regarding the washback effects of OFA?

Methodology

Participants

The sample of the study was composed of two groups of participants who were selected randomly. The first group consisted of 227 prospective teachers who were majoring in TEFL at three teacher education universities in Iran. One hundred thirty were males and 97 were females, and their ages ranged from 19 to 24. The second group included 21 male ($n= 11$) and female ($n= 10$) teacher educators who had been offering online CK (Content Knowledge) and PCK (Pedagogical Content Knowledge) courses for the TEFL students during the COVID-19 lockdown period in the context of the study. The population of the study was all TEFL prospective teachers and their educators at Iranian teacher education universities.

Participants

Due to the complex nature of washback, a mixed-methods design was used to investigate the participants' attitudes, feelings, and behaviors. Quantitative data were collected through a researcher-made questionnaire and for cross-checking the validity, qualitative data were collected via a follow-up interview. It should be noted that in the washback

literature, questionnaire, interview, and class observation are among the most applicable instruments. In the current study, observation was not employed since it was virtually impossible to observe the participants in online education.

The OFA Washback Questionnaire: Since transition to OFA was unprecedented, no questionnaire had been developed to measure its washback effects in the context of the study. Therefore, the researchers developed and validated a new questionnaire. First, the related literature was reviewed and a pool of 31 five-point Likert scale items pertaining to the given construct were written. Then, based on the experts' comments on the content and relevance of the items, several modifications were made to the original version and 24 items were kept and categorized under three subscales, namely, behavioral (10 items), cognitive (8 items), and affective (6 items) (see appendix A).

To assure the reliability and construct validity of the instrument, in a pilot study, 213 prospective EFL teachers and 14 teacher educators completed the questionnaire through online survey Google Forms. When the questionnaire showed good internal consistency ($\alpha= 0.88$), exploratory and confirmatory factor analyses were performed. For exploratory factor analysis a principal components analysis with varimax rotation was conducted to establish the structural validity of the scale. The results indicated that the KMO value was .849 and Bartlett's test was significant ($p= .000$). After the analysis, eight components were extracted with an eigenvalue greater than one but a clear break was observed between the third and fourth components. Therefore, the analysis was performed with three components and the results showed that the three components explained a total of 71.96 percent of the variance. The reliability coefficients were found to be 0.88 for the whole scale, and 0.95, 0.94, and 0.87 for the behavioral, cognitive, and affective subscales, respectively. Moreover, the results of factor analyses indicated that the four-factor solution possessed good data-model fit across all indices, $\chi^2 (201) = 458.44$, $p < 0.000$, $\chi^2/df = 2.28$, $GFI = 0.86$, $NNFI = 96$, $CFI = 0.97$, $RMSEA = 0.07$. The results of the study demonstrated that the scale was valid and reliable to measure the washback effects of the online formative assessment in the context of the study.

The OFA Washback Interview: In order to shed more light on the washback effects of the new assessment

modality, a semi-structured interview was designed and conducted with both groups of participants. Based on the results of the questionnaire, the areas of perceptual mismatches between the prospective teachers and teacher educators, and the negative washback effects of the online formative assessment were identified. Then, three interview questions were developed and the content validity of the instrument was assured in a pilot study through the comments on the appropriateness of content and language by five experts in the field (See appendix B).

Procedures

The survey was conducted in August 2021 – almost 16 months after the announcement of the state of emergency for the COVID-19 pandemic in Iran. The official announcement and subsequent lockdown coincided with the beginning of an academic semester in higher education. For the first measure, Learning Management Systems (LMS) integrated with the power of Adobe Connect for virtual classrooms was adopted. As time passed, more options were added to the platform for instructional and evaluative purposes during the next three semesters. Therefore, the time of data collection seemed ripe since enough courses had been offered online in the complete absence of on-campus face-to-face education for the participants to develop any attitudes toward the new assessment modality.

In order to collect data, an explanatory sequential mixed-method design (Ary et al., 2019) was employed. As the first step for collecting quantitative data, the validated questionnaire was completed by the participants (227 prospective EFL teachers and 21 teacher educators) via Google Forms. The collected data were analyzed using SPSS software, version 26. Then, in order to have a better picture of the given washback effects, the semi-structured interview was conducted with 32 prospective teachers and nine teacher educators. After collecting interview data, the transcriptions were coded for the predominant patterns in the participants' responses. The emerging themes and patterns in the transcriptions were grouped according to their frequency of occurrence.

Results

To answer the first research question which sought the direction of the washback effects of the OFA, a

general descriptive analysis was performed. In Table 1, the mean and standard deviation values of each effect are provided for the prospective teachers (PTs) and teacher educators (TEs).

As the table shows, the online formative assessment in the context of the study resulted in incorporating more assignments, increased PTs' autonomy, promoted their self-efficacy, stimulated more student-student interactions, extended instructional time, and led to applying more quality activities. On the contrary, this new assessment modality produced several negative effects ($\bar{x} < 3$) the most significant ones were decreasing meaningful learning, weakening PTs' motivation, lowering their learning rate, hindering classroom discussion, and declining retention. In terms of washback direction and intensity, the negative effects of the new assessment modality vastly outnumbered the positive ones by four to one.

To see if there were any significant perceptual mismatches between the TEs and PTs regarding the washback effects of the online formative assessment, the independent samples t-test was run. Before running the test, it was necessary to see whether the collected data fitted the standard assumptions for parametric tests. To check the assumption of normality, a series of Kolmogorov-Smirnov tests, which according to Ricci (2005, as cited in Larson-Hall, 2016), is the most powerful test for large sample sizes, were used. The results of these tests indicated that some data sets did not meet the normality assumption. Therefore, the non-parametric test of Mann-Whitney U was employed (Table 2).

The results of the Mann-Whitney U tests revealed a significant perceptual mismatch between the PTs and TEs regarding the cognitive subscale of washback effects ($U = 1210$, $z = -3.773$, $p = .000$, $r = .22$). But no significant difference was observed between the participants' perceptions of behavioral subscale ($U = 2125$, $z = -.743$, $p = .457$) and affective subscale of the online formative assessment washback effects ($U = 2209$, $z = -.651$, $p = .575$). Table 3 displays the relevant results.

The interview data were analyzed using MAXQDA Version 2018 to highlight thematic patterns using a grounded theory approach. Some major themes and some minor ones emerged from the interview transcripts. Figure 1 displays three major themes and their respective minor ones.

Table 1. Descriptive Statistics of Washback Effects of the OFA

Subscale / Effect	Participants	Mean	SD	Mean	SD		
Behavioral	Class attendance	PTs*	2.35	.89	2.35	.89	
		TEs	2.38	.92			
	Quantity of educators' feedback	PTs	2.86	.92	2.87	.92	
		TEs	2.90	.99			
	Quantity of assignments	PTs	4.36	.81	4.34	.81	
		TEs	4.14	.72			
	Student-teacher interaction	PTs	2.74	.97	2.76	.96	
		TEs	3.00	.83			
	Student-student interaction	PTs	3.21	1.18	3.22	1.17	
		TEs	3.29	1.05			
	Class contribution	PTs	2.63	.91	2.62	.91	
		TEs	2.57	.87			
	Contract cheating	PTs	2.77	1.40	2.73	1.39	
		TEs	2.29	1.23			
	Exam Cheating	PTs	2.48	1.31	2.43	1.29	
		TEs	1.95	1.02			
	Instructional time	PTs	3.14	1.15	3.13	1.15	
		TEs	3.05	1.20			
Practical knowledge	PTs	2.36	.88	2.39	.87		
	TEs	2.67	.65				
Cognitive	Mental engagement	PTs	2.77	.98	2.77	.964	
		TEs	2.81	.75			
	Quality of educators' feedback	PTs	2.72	.87	2.77	.88	
		TEs	3.33	.85			
	Quality of learning activities	PTs	3.05	1.07	3.08	1.06	
		TEs	3.38	.97			
	Students' learning	PTs	2.32	.95	2.34	.94	
		TEs	2.62	.80			
	Students' retention	PTs	2.30	.89	2.37	.91	
		TEs	3.10	.83			
	Instructional materials	PTs	2.83	.97	2.88	.98	
		TEs	3.43	.92			
	Teaching methods	PTs	2.40	.96	2.49	1.00	
		TEs	3.43	.92			
	Meaningful learning	PTs	2.20	.84	2.26	.85	
		TEs	2.86	.72			
	Affective	Students' self-efficacy	PTs	3.29	1.03	3.31	1.01
			TEs	3.52	.81		
Students' motivation		PTs	2.29	.93	2.32	.92	
		TEs	2.71	.78			
Students' autonomy		PTs	3.53	.96	3.54	.96	
		TEs	3.67	1.01			
Students' attitude		PTs	2.49	.96	2.50	.96	
		TEs	2.67	.96			
Students' satisfaction		PTs	2.74	.99	2.75	.98	
		TEs	2.86	.85			
Students' anxiety		PTs	2.87	1.20	2.84	1.17	

	TEs	2.52	.750		
Behavioral	PTs	28.90	4.55	28.85	4.57
	TEs	28.24	4.88		
Cognitive	PTs	20.59	4.91	20.96	4.99
	TEs	24.95	4.15		
Affective	PTs	17.20	4.05	17.27	3.99
	TEs	17.95	3.24		

* Note: PTs (n= 227), TEs (n= 21)

Table 2. Tests of Normality

Subscale	Kolmogorov-Smirnov ^a			
	Participant	Statistic	df	Sig.
Behavioral	Prospective teachers	.152	227	.000
	Teacher educators	.200	21	.028
Cognitive	Prospective teachers	.159	227	.000
	Teacher educators	.123	21	.200*
Affective	Prospective teachers	.146	227	.000
	Teacher educators	.113	21	.200*

Table 3. Mann-Whitney U test for Participants’ Perceptions

Test Statistics ^a	Behavioral	Cognitive	Affective
	Mann-Whitney U	2152	1210
Wilcoxon W	2383	27088	28087
Z	-.743	-3.773	-.561
Asymp. Sig. (2-tailed)	.457	.000	.575

a. Grouping Variable: Role

The majority of the respondents in the interviews acknowledged that the new assessment modality had resulted in a dramatic increase in assignments. Both TEs and Pts believed that online education had marginalized the final exam scores in traditional face-to-face education through applying project-based assessment. One of the PTs acknowledged this:

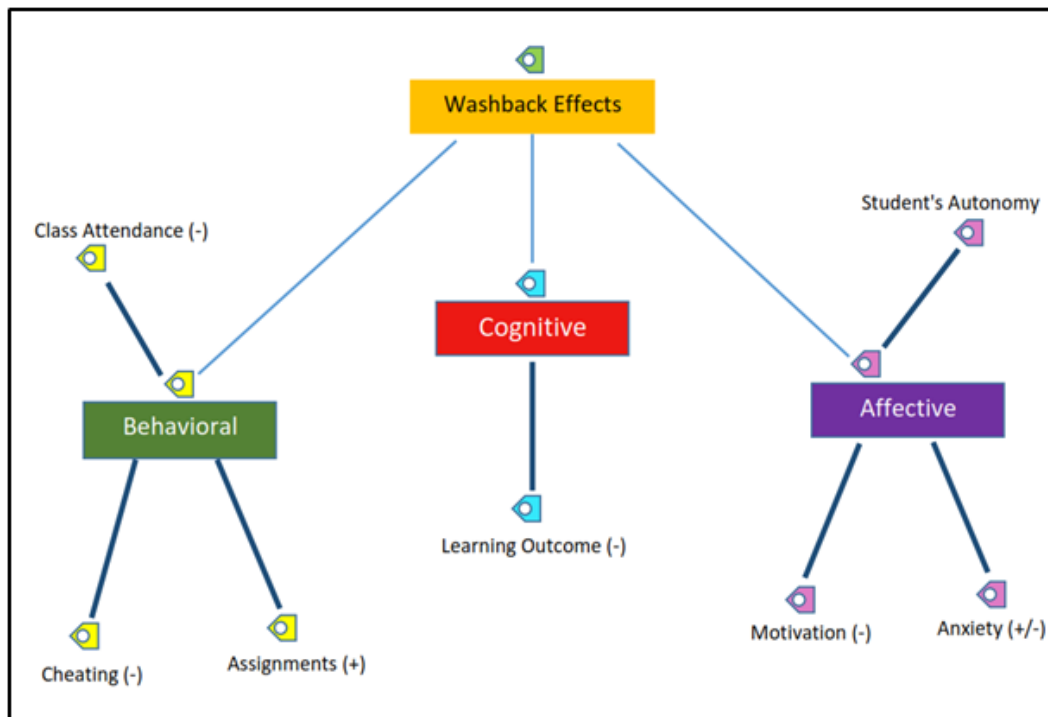
PT (1): *The most salient feature of assessment in online education is variety in assignments and homework. Nearly all the educators incorporate one or more assignments to ensure students’ engagement with the course materials.*

They attributed such an increase to the PTs’ reluctance to attend the online sessions and test session conditions. On the one hand, both groups of participants believed that the PTs’ class attendance had sharply declined physically and mentally due to technological issues, lack of in-person interaction, poor classroom management, and various distractors. In this regard, one of PTs confessed as follows:

PT (2): *Generally, we escape some classes which are not interesting and informative enough. In such cases if class attendance is obligatory, we are just a passive member of the class while being busy doing something else. If no score is assigned to class participation or class contribution, we are not motivated to attend the class.*

On the other hand, reliance on project-based assessment which was manifested in rapid proliferation of assignments was a function of exam cheating. The participants believed that since there were currently no remote proctoring platforms that surveilled test takers’ activities during the online final exams, the academic misconduct of cheating was quite prevalent. The TEs stated that they were hesitant to assign a high score to online final exams because of the potential of compromising academic integrity. One of the them commented as follows:

TE (1): *I take every precautionary measure to prevent test takers from cheating but it is still a big concern for me. In the*

Figure 1. Major and Minor Themes in the Interview Data

complete absence of proctors and surveillance systems, cheating is occurring at an alarming rate in the present competitive atmosphere of the educational setting. Since precision in scoring procedure is of vital importance for me, I prefer alternative forms of assessment which can appropriately assess students' overall course learning.

In this regard, one of PTs stated:

PT (3): Unfortunately, cheating in online exams is a rule rather than an exception. Some exams are so difficult and the majority [of students] are not that much ready. Moreover, when poor students get a high score in the exams, average and strong students don't want to lose the competition for the highest possible score especially when there is no proctoring mechanism.

Another negative behavioral washback effect of online formative assessment stated by both groups of participants was the volume and frequency of interactions between PTs and teacher educators. Although the communication channels were open 24/7, both synchronous discussions on the LMS platform and the asynchronous ones on social networks were rated as a low index by the participants. The PTs interviewed believed that they were not motivated to interact since the classes were mainly lecture-based and the TEs did not provide ample opportunities for two-way interactions by raising

questions or including critical thinking activities in their instruction. The following excerpt reveals the theme:

PT (4): For some professors, online education is a carbon copy of face-to-face education delivered in a one-way interaction mode via cyberspace. Moreover, since there is no grade assigned for online interactions or no incentive has been offered to students for engaging in interactions, the students are not motivated to participate in class discussions.

The TEs, on the contrary, pinned the blame on the PTs believing that since the PTs were not attentive enough when the online sessions were running, this lack of mental engagement hindered higher order thinking skills such as posing questions or making comments which were required for interaction. One of the TEs complained about this issue in this way:

TE (2): In online education, distractions can be a serious obstacle to learning outcome. Students' contribution and interaction decrease when there are more interesting things to do. Although their interaction has been defined as a criterion in the assessment procedure, most of them are reluctant to contribute to class discussions.

When the participants were asked to comment on the effect of the OFA on learning outcome, the two groups of participants had slightly different attitudes.

By learning outcomes, we mean the knowledge, skills, or attitudes which are supposed to be acquired by PTs during a course of instruction. The TEs believed that since alternative assessments such as term project, weekly assignment, and open-book exams had taken precedence over traditional on-campus final exams, the learning that took place was likely to be higher. Moreover, since multiple assessments were made through multiple techniques most of which were practical in nature, the rate of subsequent retention would also be higher. One of the TEs acknowledged this:

TE (3): *Online assessment techniques are at the service of promoting learning outcome. Nobody can deny that the imposed alternative assessments are more authentic than the traditional pencil and paper knowledge tests. Although the rate of learning seems unsatisfactory due to some peripheral barriers, the one which occurs is of meaningful and procedural types rather and rote and declarative one.*

Unlike the TEs, the PTs interviewed were not so satisfied with the learning outcome resulted from the new assessment modality. They attributed the failure to the academic misconducts of exam cheating and contract cheating as short cuts to passing the courses. They acknowledged that some assessment tasks were useful but lack of motivation, time, and ability made the PTs engage a third-party to complete the assignment or take the exams. One of the PTs acknowledged the issue in this way:

PT (5): *Learning in some courses is nearly negligible especially those which are not interesting or among the top priorities. For such courses, if we are required to take an online exam or submit a term paper, although against academic integrity, some students take short cuts such as getting someone to sit the exam, prepare the project, or do the assignments. Therefore, nothing like learning happens adequately!*

The affective washback effects of the online assessment were also highlighted in the interview results. Interestingly, no significant perceptual mismatches were observed between the PTs' perceptions and those of the TEs. Autonomy and sense of self-efficacy were among the emerged themes mentioned by the participants. They believed that the variety in online assessments, which made the instruction learner-centered, meant accepting more responsibilities on behalf of the PTs. They acknowledged that incorporating assessment

techniques such as term projects, writing journals, and students' presentations made the students take the initiative and feel accountable for their learning process. One of the PTs noted that:

PT (6): *The element of assessment in online education has brought us several new commitments and responsibilities. Taking on these responsibilities makes us more autonomous and self-reliant. When we have to do a research study, develop a curriculum, design an instructional unit, or review an article, this freedom of choice gives us a feel of power and control.*

A decrease in the level of learning motivation due to the online assessment was also mentioned by the interviewees. Referring to their low level of perceptual learning outcome, they believed that they had lost their motivation. They also attributed the lack of motivation to the type of assessment tasks which were individualized in nature rather than cooperative. The following excerpt by a prospective teacher reflects the theme:

PT (7): *Assessment techniques, which are numerous in quantity, have not generated motivation in students. They are much more difficult than sitting for a final exam. Moreover, in the absence of proper feedback on our assignments, we feel confused and baffled. When we experience such unpleasant conditions with negligible gain, we lose our motivation to move ahead energetically.*

Anxiety was the last major recurrent theme in the interview data. The participants, especially the PTs, mentioned that in comparison to face-to-face exam sessions, they experienced less anxiety since their performance was not supposed to be evaluated based on a single performance in an exam session. Moreover, distributing the whole score among multiple tasks done during the semester reduced their level of anxiety. Some others, on the contrary, believed that some technological issues such as poor internet connection encountered during online exams caused more anxiety. One of PTs commented on the issue in this way:

PT (8): *Reducing anxiety can be seen as an important washback effect of online assessment. Test anxiety, as the most important type of anxiety, is not considerable in the current assessment since we are not judged based on what we have memorized in the proctored final exam session. Our performance is evaluated according to more criteria during the term. The only concern that we have is poor Internet connectivity while taking online exams.*

Discussion and Conclusion

This mixed methods design study was carried out to explore the washback effects of the online formative assessment in Iranian teacher education universities. The quantitative data collected from PTs and their TEs indicated that the negative effects of the new assessment modality outnumbered the positive ones. Moreover, when it came to the washback subscales, no perceptual mismatches were observed between the PTs' and teacher educators' perceptions of the behavioral and affective effects while the two groups evaluated the affective effects of the new assessment modality significantly differently. The results of qualitative data collected via a semi-structured interview also confirmed the findings of the quantitative phase of the study.

The findings of the study partially substantiated Fitriyah and Jannah's (2021) findings which indicated that online assessment had positive effects on evaluation versatility and learners' autonomy, and negative effects on quality of interaction and anxiety. Incorporating multiple alternative assessments in the syllabus by the TEs turned out to be the most salient positive washback effect of online formative assessment. Such salience can be attributed to two factors: On the one hand, the positive impact of The OFA on student learning has been supported by a great deal of research (OECD, 2013). On the other hand, it can serve as an effective strategy for meeting the challenge of safeguarding academic integrity (Gamage et al., 2020). Such an interpretation is completely supported by the participants' concerns about academic misconducts of exam and contract cheating. On the one hand, departures from integrity such as various forms of e-cheating in online exams have been on the rise (Jaschik & Lederman, 2018). On the other hand, rapid adoption of online teaching and assessment platforms without proper surveillance systems has offered more cheating opportunities than in traditional on-campus environments (Rogers, 2006).

In addition to cheating opportunity, the pressure felt by the PTs may also prevent them from acting in an academically integrous manner (Holden et al., 2021). The perceptual pressure the PTs feel when they are not prepared for exam due to lack of mastery over the assessment tasks and activities can cause an increase in academic misconducts such as use of unauthorized materials, plagiarism, or test item leakage. In the

context of the study, the participants were not satisfied with the learning outcome. They acknowledged that when they feel incompetent while doing assignments, personal ethics cannot act as much of a deterrent.

The low level of perceived learning outcome was rated as the most important negative washback effect of the OFA by the participants. Perceived learning outcome in online education is correlated with the quality of interaction between teacher and students (Alqurashi, 2019), students' motivation (Hsu et al., 2019), and students' satisfaction (Ikhsan et al., 2019). In the context of the study, all these factors were evaluated as the negative washback effects of the new assessment modality. The findings of the study are in line with those of Baber (2020) which indicated that students' perceived learning outcome in online education is related to the quality of interlocutors' interaction, and students' level of motivation and satisfaction. The significant perceptual mismatches between the TEs and PTs toward the learning outcome resulted from the OFA is also revealing. Since "mismatches between teachers' and students' perceptions may have a detrimental impact on the teacher-learner relationship and negatively influence students' learning outcomes" (Lee & Choi, 2019, p. 78), it is expected to see such a discrepancy between the PTs and their TEs in the context of the study where they have little interaction to depict a clear picture of learning outcome.

The findings on affective washback effects are contradictory. Both groups of participants acknowledged that the students' autonomy and sense of self-efficacy promoted due to implementation of the OFA while the level of their motivation decreased drastically. The observed increase in the students' autonomy and sense of self-efficacy can be attributed to the transactional distance- the psychological, spatial, or temporal separation between students and instructors in a distance learning (Moore, 1990)- which paves the way for placing more responsibility on the students. In addition to the new circumstances, embarking on a variety of new alternative assessments may have contributed to the students' perceived sense of self-efficacy and self-reliance. Motivation, on the contrary, was ranked as the most negative affective washback effect. Motivation in online education has been proven to be complex, multifaceted, situation-dependent (Hartnett, 2016) which may decrease due to feelings of isolation (Paulus & Scherff, 2008),

frustrations with the technology (Hara & Kling 2003) and other commitments (Keller, 1999). Considering the reciprocal relationship between motivation and learning outcome (Brophy, 2010), the low level of motivation to learn on behalf of the PTs can be attributed to their perceived low level of learning outcome.

The findings of the study have some important pedagogical implications. As far as the washback effect is concerned, OFA is lagging traditional on-campus summative assessment. Instructors should be aware of the nature of the washback effects in their assessment procedure and develop the procedure in such a way that they take full advantage of formative assessment in online education. Moreover, it should be noted that washback effects operate within a complex system of interconnected elements. This phenomenon can be attributed to the fact that “washback is an interactive multi-directional process in which an ongoing interplay of different degrees of complexity takes place among the different elements of the process.” (El-Ebyary, 2009, p. 4). Therefore, a holistic integrative approach should be adopted for manipulating a pool of effects and the interplay of behavioral, affective, and cognitive ones. Finally, there are some perceptual evaluative mismatches between TEs’ intentions and PTs’ interpretations of assessment tasks in the current online education. It is recommended that educators pinpoint these areas of mismatch to make more judicious evaluative decisions.

The study clearly had some limitations which should be acknowledged. The most important limitation was lack of prior empirical studies on the topic because, at the time of data collection, the OFA had just been employed as the only assessment procedure in the context of the study. Further studies in the future can be carried out while considering the theoretical frameworks and empirical findings of the forthcoming studies being published. The second limitation deals with the instruments of data collection. In the current study, questionnaire and interview were employed for data collection. During data collection via these two instruments, an effort was made to help the participants to distinguish between online education and online assessment but it is likely that in some cases they failed to make such a distinction in their responses. More research studies can be conducted using other instruments such as observation and narrative journal.

To conclude, the OFA in the context of study has a variety of washback effects most of which are negative. Neither the TEs nor PTs are content with the new assessment modality in promoting the PTs’ learning outcome as the ultimate purpose of teacher education program. Learning outcome as the most conspicuous washback effect of any assessment procedure influences and is influenced by other behavioral and affective effects. Defiantly, all the effects operate in a complex network and no single effect can be analyzed truly and thoroughly without recourse to other effects. In fact, the washback effects of a particular assessment should be investigated in a comprehensive theoretical framework such as “nomological network” (Fulcher & Davidson, 2007, p. 8) with all invisible constructs and observable variables. Online education and OFA as the solo or dominant modalities in most educational settings are new experiences. National lockdowns and the subsequent suspension of schools and universities may not happen in the future. Nevertheless, online education and its relevant assessment (OFA) have occupied the thoughts and attention of policymakers, curriculum planners, and instructors. Needless to say, more research is needed to shed light on their various dimensions for taking full advantage of their potential.

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Appendix A.

Questionnaire

Dear participant,

As you know, the university closure due to the COVID-19 pandemic has turned face-to-face education into online education. Consequently, the summative assessment has been replaced with online formative assessment for 4 semesters. This questionnaire has been developed to elicit your opinion about the effects of the new assessment procedure on other components of education such as learning, teaching, materials etc. You are required to study each item, make a comparison between the previous summative assessment and the current online formative assessment, and check the alternative which best reflects your opinion.

Section one: *Biodata*

- 1. *Profession:* Prospective Teacher Teacher Educator
- 2. *Gender:* Male Female
- 3. *Age:*

Section two: *Questionnaire Items*

Items
1. The OFA has resulted in higher attendance on behalf of the prospective teachers (PTs). <i>Completely agree</i> <input type="checkbox"/> <i>Agree</i> <input type="checkbox"/> <i>No opinion</i> <input type="checkbox"/> <i>Disagree</i> <input type="checkbox"/> <i>Completely disagree</i> <input type="checkbox"/>
2. The OFA has resulted in more feedback by the teacher educators (TEs). <i>Completely agree</i> <input type="checkbox"/> <i>Agree</i> <input type="checkbox"/> <i>No opinion</i> <input type="checkbox"/> <i>Disagree</i> <input type="checkbox"/> <i>Completely disagree</i> <input type="checkbox"/>
3. The OFA has resulted in higher attendance on behalf of the prospective teachers (PTs). <i>Completely agree</i> <input type="checkbox"/> <i>Agree</i> <input type="checkbox"/> <i>No opinion</i> <input type="checkbox"/> <i>Disagree</i> <input type="checkbox"/> <i>Completely disagree</i> <input type="checkbox"/>
4. The OFA has resulted in more interaction between TEs and PTs. <i>Completely agree</i> <input type="checkbox"/> <i>Agree</i> <input type="checkbox"/> <i>No opinion</i> <input type="checkbox"/> <i>Disagree</i> <input type="checkbox"/> <i>Completely disagree</i> <input type="checkbox"/>
5. The OFA has resulted in more interaction among PTs. <i>Completely agree</i> <input type="checkbox"/> <i>Agree</i> <input type="checkbox"/> <i>No opinion</i> <input type="checkbox"/> <i>Disagree</i> <input type="checkbox"/> <i>Completely disagree</i> <input type="checkbox"/>
6. The OFA has resulted in more contribution to class discussion on behalf of PTs. <i>Completely agree</i> <input type="checkbox"/> <i>Agree</i> <input type="checkbox"/> <i>No opinion</i> <input type="checkbox"/> <i>Disagree</i> <input type="checkbox"/> <i>Completely disagree</i> <input type="checkbox"/>
7. The OFA has resulted in more cheating in assignments. * ¹ <i>Completely agree</i> <input type="checkbox"/> <i>Agree</i> <input type="checkbox"/> <i>No opinion</i> <input type="checkbox"/> <i>Disagree</i> <input type="checkbox"/> <i>Completely disagree</i> <input type="checkbox"/>
8. The OFA has resulted in more cheating in exams. * <i>Completely agree</i> <input type="checkbox"/> <i>Agree</i> <input type="checkbox"/> <i>No opinion</i> <input type="checkbox"/> <i>Disagree</i> <input type="checkbox"/> <i>Completely disagree</i> <input type="checkbox"/>
9. The OFA has resulted in longer instructional time. <i>Completely agree</i> <input type="checkbox"/> <i>Agree</i> <input type="checkbox"/> <i>No opinion</i> <input type="checkbox"/> <i>Disagree</i> <input type="checkbox"/> <i>Completely disagree</i> <input type="checkbox"/>
10. The OFA has resulted in acquiring more practical knowledge in PTs. <i>Completely agree</i> <input type="checkbox"/> <i>Agree</i> <input type="checkbox"/> <i>No opinion</i> <input type="checkbox"/> <i>Disagree</i> <input type="checkbox"/> <i>Completely disagree</i> <input type="checkbox"/>
11. The OFA has resulted in more mental engagement in PTs. <i>Completely agree</i> <input type="checkbox"/> <i>Agree</i> <input type="checkbox"/> <i>No opinion</i> <input type="checkbox"/> <i>Disagree</i> <input type="checkbox"/> <i>Completely disagree</i> <input type="checkbox"/>

¹ The asterisk (*) means that the item was reverse scored.

12. The OFA has resulted in more quality feedback on behalf of TEs. <i>Completely agree</i> <input type="checkbox"/> <i>Agree</i> <input type="checkbox"/> <i>No opinion</i> <input type="checkbox"/> <i>Disagree</i> <input type="checkbox"/> <i>Completely disagree</i> <input type="checkbox"/>
13. The OFA has resulted in more quality learning activities. <i>Completely agree</i> <input type="checkbox"/> <i>Agree</i> <input type="checkbox"/> <i>No opinion</i> <input type="checkbox"/> <i>Disagree</i> <input type="checkbox"/> <i>Completely disagree</i> <input type="checkbox"/>
14. The OFA has resulted in more learning outcomes. <i>Completely agree</i> <input type="checkbox"/> <i>Agree</i> <input type="checkbox"/> <i>No opinion</i> <input type="checkbox"/> <i>Disagree</i> <input type="checkbox"/> <i>Completely disagree</i> <input type="checkbox"/>
15. The OFA has resulted in higher retention in PTs. <i>Completely agree</i> <input type="checkbox"/> <i>Agree</i> <input type="checkbox"/> <i>No opinion</i> <input type="checkbox"/> <i>Disagree</i> <input type="checkbox"/> <i>Completely disagree</i> <input type="checkbox"/>
16. The OFA has resulted in choosing better instructional materials on behalf of TEs. <i>Completely agree</i> <input type="checkbox"/> <i>Agree</i> <input type="checkbox"/> <i>No opinion</i> <input type="checkbox"/> <i>Disagree</i> <input type="checkbox"/> <i>Completely disagree</i> <input type="checkbox"/>
17. The OFA has resulted in choosing more effective teaching methods on behalf of TEs. <i>Completely agree</i> <input type="checkbox"/> <i>Agree</i> <input type="checkbox"/> <i>No opinion</i> <input type="checkbox"/> <i>Disagree</i> <input type="checkbox"/> <i>Completely disagree</i> <input type="checkbox"/>
18. The OFA has resulted in higher level of meaningful learning on behalf of PTs. <i>Completely agree</i> <input type="checkbox"/> <i>Agree</i> <input type="checkbox"/> <i>No opinion</i> <input type="checkbox"/> <i>Disagree</i> <input type="checkbox"/> <i>Completely disagree</i> <input type="checkbox"/>
19. The OFA has resulted in promoting the sense of self-efficacy in PTs. <i>Completely agree</i> <input type="checkbox"/> <i>Agree</i> <input type="checkbox"/> <i>No opinion</i> <input type="checkbox"/> <i>Disagree</i> <input type="checkbox"/> <i>Completely disagree</i> <input type="checkbox"/>
20. The OFA has resulted in an increase in the level of motivation in PTs. <i>Completely agree</i> <input type="checkbox"/> <i>Agree</i> <input type="checkbox"/> <i>No opinion</i> <input type="checkbox"/> <i>Disagree</i> <input type="checkbox"/> <i>Completely disagree</i> <input type="checkbox"/>
21. The OFA has resulted in an increase in the level of autonomy in PTs. <i>Completely agree</i> <input type="checkbox"/> <i>Agree</i> <input type="checkbox"/> <i>No opinion</i> <input type="checkbox"/> <i>Disagree</i> <input type="checkbox"/> <i>Completely disagree</i> <input type="checkbox"/>
22. The OFA has resulted in developing more positive attitudes in PTs. <i>Completely agree</i> <input type="checkbox"/> <i>Agree</i> <input type="checkbox"/> <i>No opinion</i> <input type="checkbox"/> <i>Disagree</i> <input type="checkbox"/> <i>Completely disagree</i> <input type="checkbox"/>
23. The OFA has resulted in an increase in the level of satisfaction in PTs. <i>Completely agree</i> <input type="checkbox"/> <i>Agree</i> <input type="checkbox"/> <i>No opinion</i> <input type="checkbox"/> <i>Disagree</i> <input type="checkbox"/> <i>Completely disagree</i> <input type="checkbox"/>
24. The OFA has resulted in an increase in the level of anxiety in PTs. * <i>Completely agree</i> <input type="checkbox"/> <i>Agree</i> <input type="checkbox"/> <i>No opinion</i> <input type="checkbox"/> <i>Disagree</i> <input type="checkbox"/> <i>Completely disagree</i> <input type="checkbox"/>

Appendix B.

Interview Questions

1. In comparison to face-to-face summative assessment, what have been the positive and negative washback effects of the current online formative assessment on your behaviors and your educators' behaviors?
2. What have been the positive and negative washback effects of the online current formative assessment on your emotions and feelings?
3. What have been the positive and negative washback effects of the current online formative assessment on the quality of your learning?

Appendix C.***Item-level Results and Factor Loading*****Table C-1.** Item-total Statistics

Item	Mean	SD	Corrected item-total Correlation	Alpha-if-item- Deleted
1	2.36	0.918	0.495	0.877
2	2.88	0.936	0.595	0.874
3	4.33	0.837	0.498	0.877
4	2.74	0.975	0.575	0.875
5	3.23	1.186	0.549	0.875
6	2.65	0.936	0.526	0.876
7	2.77	1.404	0.462	0.878
8	2.46	1.324	0.537	0.875
9	3.13	1.177	0.360	0.881
10	2.36	0.891	0.497	0.877
11	2.81	0.973	0.249	0.883
12	2.75	0.885	0.571	0.875
13	3.06	1.077	0.520	0.876
14	2.31	0.947	0.959	0.874
15	2.32	0.921	0.570	0.875
16	2.85	0.984	0.523	0.876
17	2.45	0.990	0.620	0.873
18	2.21	0.852	0.562	0.875
19	3.28	1.034	0.198	0.885
20	2.28	0.934	0.393	0.879
21	3.54	0.982	0.512	0.884
22	2.47	0.982	0.525	0.876
23	2.73	0.999	0.315	0.881
24	2.88	1.207	0.250	0.884

Table C-2. KMO and Bartlett’s Test

Kaiser-Meyer-Olkin (Kmo) Measure of Sampling Adequacy	Bartlett’s Test of Sphericity		
	<i>Sig</i>	<i>Df</i>	<i>Approx. Chi-Square</i>
0.849	0.0001	276	6569.996

Figure C-1. Scree Plot

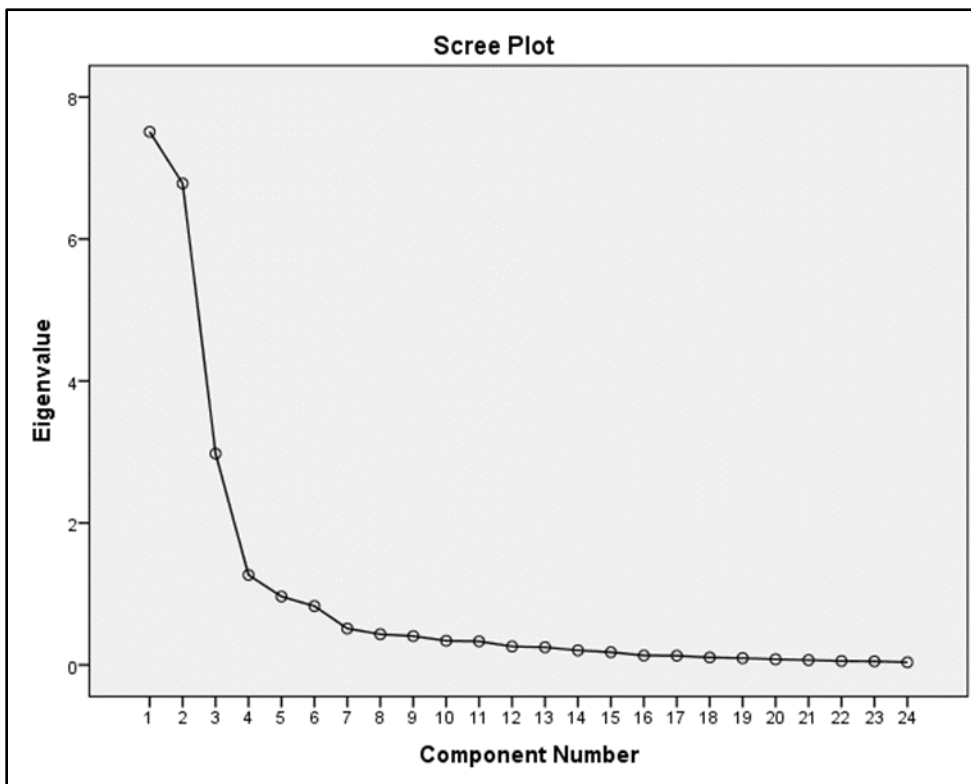


Table C-3. Total Variance Explained

Item	Eigenvalue	% Of Variance	% Of <i>Cumulative</i> Variance
1	6.86	28.59	28.59
2	6.01	25.02	53.61
3	3.82	15.90	69.51
4	1.86	7.74	77.25

Table C-4. Component Matrix

Item	Components			
	1	2	3	4
1	0.886			
2	0.907			
3	0.819			
4	0.947			
5	0.889			
6	0.946			
7				0.851
8				0.840
9	0.892			
10	0.879			
11		0.569		
12		0.930		
13		0.876		
14		0.774		
15		0.809		
16		0.947		
17		0.883		
18		0.863		
19			0.881	
20			0.908	
21			0.873	
22			0.444	
23			0.530	
24			0.896	

Table C-5. Factor Loading

Items	Behavioral	Cognitive	Affective
1. The OFA has resulted in higher attendance on behalf of the prospective teachers (PTs).	0.866		
2. The OFA has resulted in more feedback by the teacher educators (TEs).	0.937		
3. The OFA has resulted in higher attendance on behalf of the prospective teachers (PTs).	0.840		
4. The OFA has resulted in more interaction between TEs and PTs.	0.945		
5. The OFA has resulted in more interaction among PTs.	0.916		
6. The OFA has resulted in more contribution to class discussion on behalf of PTs.	0.923		
7. The OFA has resulted in more cheating in assignments. * ²	0.616		
8. The OFA has resulted in more cheating in exams. *	0.589		
9. The OFA has resulted in longer instructional time.	0.841		
10. The OFA has resulted in acquiring more practical knowledge in PTs.	0.876		
11. The OFA has resulted in more mental engagement in PTs.		0.567	
12. The OFA has resulted in more quality feedback on behalf of TEs.		0.921	
13. The OFA has resulted in more quality learning activities.		0.867	
14. The OFA has resulted in more learning outcomes.		0.758	
15. The OFA has resulted in higher retention in PTs.		0.810	
16. The OFA has resulted in choosing better instructional materials on behalf of TEs.		0.941	
17. The OFA has resulted in choosing more effective teaching methods on behalf of TEs.		0.886	
18. The OFA has resulted in higher level of meaningful learning on behalf of PTs.		0.876	
19. The OFA has resulted in promoting the sense of self-efficacy in PTs.			0.873
20. The OFA has resulted in an increase in the level of motivation in PTs.			0.915
21. The OFA has resulted in an increase in the level of autonomy in PTs.			0.872
22. The OFA has resulted in developing more positive attitudes in PTs.			0.466
23. The OFA has resulted in an increase in the level of satisfaction in PTs.			0.522
24. The OFA has resulted in an increase in the level of anxiety in PTs. *			0.897

¹ The asterisk (*) means that the item was reverse scored.

Table C-6. Post-exploratory Factor Analysis Reliability Analysis

(Sub)Scale	No. of Items	Mean	SD	Cronbach Alpha
Whole Scale	24	2.79	0.532	0.882
Behavioral	10	2.89	0.875	0.943
Cognitive	8	2.60	0.803	0.940
Affective	6	2.86	0.808	0.877

Table C-7. Confirmatory Factor Analysis: Model Fit Indices

Index	Goodness-of-fit indices	
	Value	Acceptable rate
X ² /df	2.28	<3
RMSEA	0.07	<.08
CFI	0.97	>0.9
IFI	0.97	>0.9
GFI	0.86	>0.9
NNFI	0.96	>0.9

Figure C-2. The Final Structure of the Model

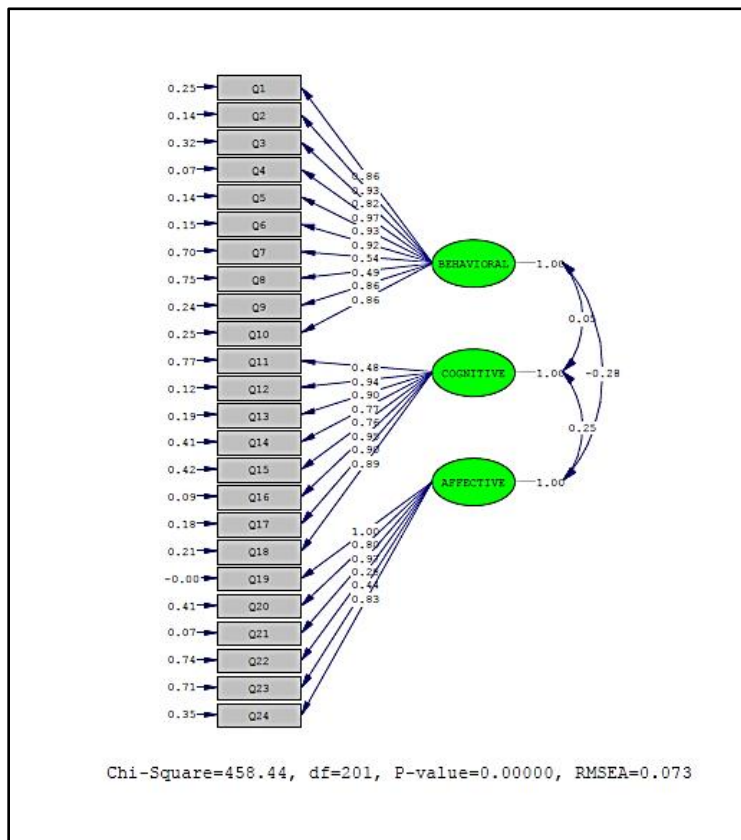


Table C-8. Factor Loading and T Values of Items

Item	Factor loading	T	P-value	Item	Factor loading	T	P-value
1	0.86	16.75	0.0001	13	0.90	18.18	0.0001
2	0.93	18.97	0.0001	14	0.77	13.97	0.0001
3	0.82	15.68	0.0001	15	0.76	13.99	0.0001
4	0.97	20.35	0.0001	16	0.95	19.98	0.0001
5	0.93	18.89	0.0001	17	0.90	18	0.0001
6	0.92	17.87	0.0001	18	0.89	17.44	0.0001
7	0.54	9.05	0.0001	19	1	17.02	0.0001
8	0.49	8.05	0.0001	20	0.80	12.29	0.0001
9	0.86	16.84	0.0001	21	0.97	16.39	0.0001
10	0.86	16.70	0.0001	22	0.28	4.54	0.0001
11	0.84	8	0.0001	23	0.44	7.05	0.0001
12	0.94	19.41	0.0001	24	0.83	12.96	0.0001