



The Impact of Rapid Serial Visual Presentation (RSVP) on Awareness of Reading Strategies

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ABSTRACT: The purpose of the current study was to examine the impact of Rapid Visual Presentation (RSVP) technology on English as a Foreign Language (EFL) learners' awareness of reading strategies. Sixty-six EFL students participated in the study and received instructions for boosting their reading via Reading Trainer Application for twelve weeks. Their entry-level of reading strategies awareness was assessed by Metacognitive Awareness of Reading Strategies Inventory (MARSIR) prior to and after the study. At the outset, a modest number of participants felt slightly tension the grounds that they had scarcely been exposed to any language learning applications on smartphones. The result of the study attested that the participants' reading strategies awareness generally improved after the experiment. Further analysis postulated that the awareness of all three categories of MARSIR, that is, global reading strategies (GRS), support reading strategies (SRS), and problem-solving strategies (PSS) were significantly enhanced after the intervention. To assess the magnitude of the intervention's effect, the effect sizes were calculated, and the values of the eta squared indicated a substantial effect for improving MARSIR in general ($\eta^2 = 0.42 > 0.14$). It was also revealed that the effect sizes for categories of MARSIR were 0.35 for GRS, 0.13 for PSS and 0.43 for SRS respectively, suggesting a more substantial effect for the intervention to improve SRS at the end of the experiment.

Keywords: RSVP; reading; strategies; application; MALL.

Abbreviations: EFL, English as a foreign language; SLA, second-language acquisition; TALL, technology-assisted language learning; M-learning, mobile learning; PDA, personal digital assistants; MALL, mobile-assisted language learning; CALL, computer-assisted language learning; PALL, pen assisted language learning; RSVP, rapid serial visual presentation; R.C., reading comprehension; ESL, English as a second language; wpm, words per minute; TEFL, Teaching English as a Foreign Language; MARSIR, Metacognitive Awareness of Reading Strategies Inventory-Revised; SORS, Survey of Reading Strategies; L1, first language; GRS, Global Reading Strategies; PSS, Problem-Solving Strategies; SRS, Support Reading Strategies.

I. INTRODUCTION

The 21st-century is tied in with swift enhancements in the realm of computer technologies that have gained prominence amongst all levels of education [1]. The rapid expansion of information technologies and the employment of computers, laptops, tablets, and smartphones develop into an everyday routine in societies, and as a result, students' cognizance of the computer knowledge has given rise to the emergence of novel instructional forms [2]. As lies the case with many other disciplines, language education has explored myriad opportunities to improve teaching and learning efficiency by integrating multifarious types of technologies into language classes.

Technology advancement could be the principal factor behind the enhancement of autodidacticism (commonly known as self-education or self-learning), especially in the field of English as a Foreign Language (EFL) and has prevailed upon learners to sustain the learning process individually [3], whenever and wherever. It is attested that nowadays "everyday language use is so tied to technology that learning language through technology has become a fact of life with important

implications for all applied linguists, particularly for those concerned with facets of SLA" [4 p. 1].

Research acknowledges the prominence of Technology Assisted Language Learning (TALL) as a tool in language learning [5], and a number of studies ascertained that students utilizing TALL outperformed those who experienced traditional instruction. [6-7]. Besides, the utilization of technology has enriched language teaching/learning by consistently maintaining the quality of instruction with a minimum amount of teacher-student contact and not adversely exerting a seminal influence on the learning objectives [8].

Lately, a surge concerning the utilization of mobile devices as instructional gadgets has spawned the exponential growth of academic institutions, seeking to investigate the potentials of employing such omnipresent gadgets on learners, both inside and outside the class milieu [9]. While the decisions are made, technology resumes influencing learners' life within and beyond the classroom to the extent that they autonomously draw upon it to augment their learning experience [10]. Furthermore, the implementation of mobile technology for pedagogical purposes prevails amongst societies as mobile devices are developed,

advanced, and promoted with a more pivotal role to play within the routine lives of all [11].

The implementation of mobile tools into learning is extensively growing at such an exponential rate that researching its merits and demerits in academia is highly required [12]. It is suggested that the arrival of mobile technologies will leave a substantially profound impact on human's lives compared to the ascertainment of personal computers and the Internet [13]. This is admittedly endorsed by recent data as of the approximately seven billion people on Earth; there are roughly four billion cellphones. This leads to a remarkable transformation in not only the way social relationships are framed but also how professional, and vocational advancements are redefined.

The overspread deployment of mobile devices among people of all walks of life and the emergence of innumerable types of applications on a daily basis for virtually any type of human activity have inspired researchers to examine the effect of such applications on people's internal and external forces such as beliefs, attitudes, behaviors, and performances. This turns out to be more profoundly significant particularly when the impact of such devices and applications on learning and teaching outcome is argued.

Mobile learning, as a novel tool to fill the deficiency of former distance learning systems [1], is a way of learning endorsed via the utilization of computers and multifarious communication techniques [14-16]. M-learning is delineated as a collaborative and technology-driven form of learning wherein students are dynamically engaged in stimulating and practical pedagogical tasks by communication and collaboration with their mobile gadgets, personal digital assistants (PDAs), and cellular phones [17]. In this framework, MALL is referred to as the employment of mobile-based technologies in language acquisition, within the environments where certain benefits are accrued from gadget's portability to language learners [18].

MALL, as a subclass of both M-learning and computer-assisted language learning (CALL), prescribes an approach to language acquisition, aided or heightened by the utilization of portable mobile devices, where both old-style learning and distance learning are supported [19]. MALL-based language learning affords abundant advantages for both learners and teachers, including interactive activities as well as engaging multimedia applications [20]. Mobile technologies contain the prospect of endorsing foreign language acquisition and would bring added value to learning by increasingly gaining new users and offering growing capacity so that more sophisticated utilization would be viable, which not only exerts a seminal influence over cultural practices but also provides new contexts for learning [21].

Numerous ground-breaking applications embracing mobile technology have been attempted in language learning [22], and thus, a whole host of studies have attempted to examine the effect of applying mobile gadgets to English language instruction by dint of their unique characteristics that enable them to be apposite devices for modern education particularly in terms of affording exploration and sharing the learning content [1, 23, 24]. It is even attested that "the future of language learning lies more with MALL and especially with pen assisted language learning (PALL) than with

CALL"[25, p. 539] owing to distinguishing features of MALL which comprise "mobility, ubiquity, and connectivity; portability and handleability; convergence, multifunctionality, cross-platform blending, optionality, and convenience; access, accessibility, availability, and affordability; and context-awareness, personalization, and flexibility" [25, p. 542].

As are volutionary mobile application, Rapid Serial Visual Presentation (RSVP) has this unique feature of presenting words (or intermittently, clusters of words) set at a fixed speed and point [26]. In RSVP, words are sequentially shown at a time so as to curtail the eye movements and ascend the intent concentration during the reading process. In other words, RSVP is the process of sequentially displaying images at the same spatial location at high presentation rates with multiple images per second, as an instance with a stimulus onset asynchrony no greater than 500ms but often lower than 100ms, i.e., >10 stimuli presented per second [27].

Psycholinguists and psychologists have extensively drawn upon RSVP technology in learning as it enables them to manage the exposure period of the stimuli and evaluate its effect on retention, recognition, and comprehension [28]. As a result, RSVP has been ascertained to be a suitable tool for expediting teaching and learning outcomes, generally in mainstream education and, more specifically, in language learning. RSVP has tremendous potential for improving the reading skills of language learners with diverse characteristics, including age, language proficiency, and gender.

RSVP was formerly considered as one of the experimental models employed in the analysis of attentional mechanisms. Forster [26] applied it to written language as well as the comprehension process. RSVP is different from regular reading, wherein readers spend a great deal of time on perusing words and considering a whole host of factors such as word length and frequency, the function of words (whether they introduce a new topic) and their location (whether they are in the middle or at the beginning of a sentence, etc.) [29].

Subsequently, in order to possess an adequate amount of time to process certain words, which are prone to adversely affecting reading comprehension (R.C.), the readership might opt for the elimination of the impending issues. In any case, when set beside regular reading, RSVP technology compels the readers to pursue every single word of the text, including the ones missed or avoided while reading typically. Hence, RSVP might arguably retard the reading rate at particular paces. Axiomatically, various facts corroborate the assumption that RSVP is capable of conditioning R.C. [30-33]. A majority of studies conducted upon RSVP indicate that comprehension could be at a fine level and even superior or tantamount to natural reading. Yet, there are some contributory factors, capable of exerting an adverse influence on R.C. in RSVP. R.C. is significantly curtailed during the time that learners fleetingly glance through every single word for a short period (like 85 ms) [29]. Besides, provided that learners are not granted with the pause option at the end of each sentence, they will be unable to attend to the R.C. questions properly as if considerable deterioration respecting their performance will be observed [33].

From a pedagogical vantage point, what educators expect from the learners is to gain more competence in reading. Driven by the theory of verbal efficiency devised by Perfetti [34], being able to read could be ascribed to both reading rate as well as comprehension. By the same token, Grabe [35] attributes the proper reading speed as well as appropriate command of comprehension to the major qualities of fluent reading in language learning.

RSVP enables users to manipulate their reading pace in such a way that they become capable of pursuing the bottom of the passage during the dedicated time which is relatively in contradiction with old-style and time-based reading activities where a modest number of learners might not be able to do during the set time period. Reading speed in RSVP is unswervingly more exponential in comparison with old-style reading speed tasks, particularly in the light of the satisfactory degree of comprehension; yet, it is worth noting that only a modest number of partakers are content with it [36]. Other than that, by virtue of its nature, RSVP impedes the employment of the R.C. techniques, frequently taught in ESL classes, so as to heighten learners' comprehension level, as is the case with scanning and skimming [37].

An investigation on the potential benefits accrued from RSVP technology on an elderly readership concluded that the profits obtained by RSVP lessen following the curtailment of contrast sensitivity and visual acuity descends [38]. The comparison between RSVP and regular reading has revealed that the typical outcomes of an ordinary reading are also attainable in short sentences as long as the presentation speed exceeds a particular diminution beyond which attentional blinks may transpire [40]. It is also contended that the RSVP simulates the visual experience of regular reading and removes the essentials for movement of the eyes [39]. Moreover, it is argued that RSVP eliminates the occurrence of regressions and precludes learners from pursuing the previously read sections of passage all over again, which would, in turn, leave a negative mark on comprehension [40]. The reason being that regressions and rereading frequently transpire at the time the readers encounter a nuisance while processing the linguistic content of the passage. It is also documented that factors including the text size, visual structure, segmentation unit, as well as presentation units are some of the salient factors, exerting a major influence on the comprehension of a passage in RSVP technology [41]. Also, the eye movements are inherently inclined to pursue the direction of the passage while reading, approximately 10 to 15 percent of the time dedicated to R.C. stems from regressions, referred to as backward gaze moves in a sentence, made so as to re-analyze the materials not plainly discerned or grasped [39].

Controlling the duration and sequence of word processing along with the oculomotor system is of paramount importance in the precise understanding of passages in such a way that eliminating regressions jeopardizes comprehension exponentially [42]. It is also indicated that comprehension is better in traditional reading compared to RSVP, albeit there is a significant diminution of 40% in reading rate [43]. However, being capable of making regressions is not the only

distinguishing factor between the old-style reading and RSVP as though a broad body of research demonstrates that while individuals are reading, gaining access to knowledge and information initially commences with words prior to having them fixated through the parafoveal processing as though obtained information is subsequently utilized so as to expedite processing as soon as the words are directly fixated [39, 42].

On the basis of RSVP studies conducted in the past decades, it can be concluded that deciding upon the ultimate set of presentation parameters for rapid serial visual presentation is still a relatively demanding task [31]. Multifarious studies demonstrate that more often than not, individuals are capable of comprehending the passage presented at speed analogous to traditional skim-reading technique, a number between 8 to 12 words in every second [44-45]. Just like the old-style text presentation formats, reading at a pace of 250 words per minute (wpm) (i.e., four words per second) might appreciably enhance the performance [31].

As the reading speed proceeds, the mentioned speed, R.C., as well as retention, considerably reduces [29, 46, 44, 32]. With regard to comprehension, no appreciable discrepancy is observed between RSVP technology, set at a pace of 250 wpm and an ordinary portable text format gadget; on balance, however, the more the RSVP rate ascends, the lower the extent of comprehension in reading becomes [47]. Since movements of the eyes are roughly eliminated while reading a text using RSVP technology, this might give rise to the prevailing argument regarding the drawbacks held by RSVP compared to traditional reading [39, 45]. The assumption that removing eye movements would potentially diminish the cognitive load, proposed by a modest number of researchers [32], is widely rejected by multifarious scholars [48]. RSVP technology might augment the cognitive load and, subsequently, divert both concentration and attention of the reader from the text pursued [49].

From a pedagogical perspective, conducting further research studies on the topic seems to be pivotal as reviewing the literature postulates that an overwhelming majority of the research conducted in this area merely shed light on native-speaker subjects or the differences observed between males and females as though the impact of RSVP on EFL/ESL learners especially within MALL environment is admittedly scarce [45]. Furthermore, while some scholars have paid conspicuous heed to the differences in reading comprehension and reading rate as a result of implementing RSVP technology, to the best knowledge of the authors, no study has focused on changes in language learners' repertoire of strategy use and awareness as a result of applying such technology in instruction. Moreover, the current research surpasses prior studies on the grounds that it entails the examination of eye-movement impact through RSVP technology on learners' awareness of reading strategies within the MALL environment. Therefore, the current study seeks to address the following research question: Does RSVP technology have any significant impact on EFL learners' development of awareness of reading strategies?

II. MATERIALS AND METHODS

A. Participants

Sixty-six university students took part in this study. The sample consisted of both males and females within a range of 18-22 years old, majoring in Teaching English as a Foreign Language (TEFL).

B. Instruments

As will be argued below, Metacognitive Awareness of Reading Strategies Inventory (MARSIR) and Reading Trainer application constitute the instruments utilized in this study.

MARSIR: The revised version of MARSIR, a self-report instrument designed to assess students' awareness of reading strategies when reading academic or school-related materials [50], was utilized both prior to and after the study.

MARSIR has been devised as an alternative to Survey of Reading Strategies (SORS) [51] to be implemented to assess L1 students' metacognitive awareness of reading strategies. Metacognition entails both recognition and supervision of an individual's thinking processes [52]. In reading, metacognitive knowledge refers to "the knowledge of the readers' cognition in the way of reading and the self-control mechanisms they exercise when monitoring and regulating text comprehension"[51]. On balance, however, it is reported that "for students with advanced levels of English proficiency, either measure is fine to use"[50]. As a result, on account of practicality issues, and as the participants were advanced EFL learners, MARSIR was deployed in this study.

The MARSIR is intended to tap into learners' metacognitive knowledge with respect to the strategies employed by them while dealing with academic passages. It measures three broad categories of strategies, as follows:

— Global Reading Strategies (GRS) (items 1, 3, 5, 12, and 13), which could be regarded as generalized, or global reading techniques employed by learners to set the stage for the reading act by planning how to cope with passages and check their comprehension level of the text. (e.g., having a purpose while reading and deciding whether the content of the passage is in accordance with that purpose, previewing and anticipating the content of the passage, taking readers' background knowledge into consideration to assist comprehension, and determining what to read and what to neglect, etc.);

— Problem-Solving Strategies (PSS) (items 7, 9, 11, 14, and 15), which are localized, focused problem-solving or repair measures employed to overcome complications encountered in the comprehension of textual information (e.g., examining individuals' comprehension upon coping with conflicting information, re-perusing ambiguous passages for further comprehension, perusing slowly but meticulously, ascertaining the right path after distractions or losing focus, etc.);

— Support Reading Strategies (SRS) (items 2, 4, 6, 8, and 10), which offer the support mechanisms or tools designed to assist learners to comprehend the content they are perusing and to sustain responsiveness to reading (e.g., taking notes, reading aloud, summarizing to reflect upon the overriding knowledge as well as the

utilization of reference materials, as is the case with dictionaries and other support systems, etc.) [50, 52].

It is worth noting that the foregoing categories support and interact with one another when utilized during the procedure of constructing meaning from the passage [53].

The items are anchored on a five-point Likert scale (1= "I have never heard of this strategy before"; 2= "have heard of this strategy, but I do not know what it means"; 3= "I have heard of this strategy, and I think I know what it means"; 4= "I know this strategy, and I can explain how and when to use it"; and 5= "I know this strategy quite well, and I often use it when I read"). Average scores of 3.5 or higher signify a high level of awareness, while scores of 2.5 to 3.4 and 2.4 or lower imply a medium level of awareness and low level of awareness, respectively.

It is reported that the original MARSIR instrument was validated through a whole host of partakers representing learners with parallel reading skills ranging from middle school to university. What is more, through the utilization of Cronbach's coefficient alpha, the internal reliability index of the scale and its three documented categories (GRS, PSS, and SRS) was reported to range from 0.89 to 0.93, and the reliability index of the total sample (MARSIR) was ascertained to be 0.93, suggesting reliable measures of metacognitive awareness of reading strategies [50]. The reliability of MARSIR in this study was verified to be 0.78 for pre-test and 0.70 for the post-test.

Reading Trainer Application: Reading Trainer is an award-winning RSVP based app, rated 4.7/5 by over 17 thousand users on Play Store and App Store. The interactive educational application is available on all three platforms of Android, iOS, and Windows, and is compatible with smartphones, phablets, and tablets. Featuring RSVP reading mode, 12 multifarious sorts of challenges help users elevate their reading rate while boosting their retention rate simultaneously. Through individual training steps, the application exercises the eyes and builds up users' mental capacity, which, in turn, results in better memory. It begins by assessing users' current reading rate in WPM (words per minute) and then takes them through virtually a dozen units of study accompanied by different types of tasks, aimed at training their brains so as to read swifter through merely concentrating upon major characters or information.

A series of exercises provided by the software are pertinent to eye-brain activities such as following a moving circle across the screen merely by eyes or reading numbers flashing across the screen, while other tasks entail swift feedback from the users such as typing in words or numbers that flash quickly across the screen. The application monitors users' progress at each stage, enabling them to take a reading speed test any time to become cognizant of their growth. Besides, learners are urged to do one unit per learning session, virtually in 10 minutes of training, and afterward rest their brains to help them process the new connections. The Power Reader section, also empowered by RSVP technology, prevails upon learners to conclude their daily work while practicing major reading skills through determining their desired display mode (fixation per row, number of words, centered words and highlighted lines),

text's topic as well as the numbers of WPM they tend to read.

The application provides users with diagrams and statistics on their reading speed, retention, performance, and in-app reading tasks as the results of each training exercise are recorded for further analysis. Higher stars signify learners are approaching the goal of the task, i.e., more effective reading skills, which consequently spawns exceptionally high reading speeds along with a decent level of retention. Last but not least, the application is reported to be effective in improving foreign language skills in a wide range of languages, as it supports English, French, German, Spanish, Italian, Portuguese, Russian, Polish, and Turkish [54].

C. Procedure

Sixty-six advanced EFL learners were selected, and their entry awareness of reading strategies was examined by MARSIR. Afterward, they were introduced to Reading Trainer Application and the way it functions. They received instructions for 12 consecutive weeks to work on the challenges designed based on the application. They were also asked to do additional exercises at home. At the end of the instruction, the participants' awareness of reading strategies was reinvestigated by MARSIR. The results were subsequently analyzed, and the findings were interpreted and discussed.

III. RESULTS AND DISCUSSION

The descriptive statistics of MARSIR and its three categories in pre- and post-tests are depicted in Table 1. As this table shows, prior to the experiment, the students have almost a medium level of awareness of reading strategies when the total mean value of MARSIR is considered (Mean=3.584, SD=0.592). This also holds true when three categories of strategies are examined. The lowest mean value is related to GRS (Mean=3.406, SD=0.829), while PSS and SRS mean values are marginally higher (Mean=3.681, SD=0.678; Mean=3.666, SD=0.610 respectively).

When the mean values are studied after the experiment, it is revealed that students' awareness of reading strategies has developed in general (Mean=4.040, SD=0.452) and in three categories of MARSIR. The most massive value is related to SRS (Mean=4.112, SD=0.551) followed by PSS (Mean=4.109, SD=0.542) and GRS (Mean=3.9, SD=0.627).

To answer the research question and examine the effect of RSVP on the development of reading strategies, paired-samples t-test was used. The results of t-tests are depicted in Table 2. As the results suggest, the level of awareness of deploying reading strategies improved overall after the experiment. This finding lends credence to the preliminary studies on the relationship between reading strategies and comprehension [55] as alternative reading instruction may give rise to higher levels of strategy use and awareness [56]. The reason of this finding can be first and foremost pertinent to the fact that implementing MALL in the class has elevated participants' motivation and interest in reading as "the most important obstacle to a sense of comprehension or satisfaction is an unwillingness to confront the input" [57]. While interest in reading proliferates, the deployment and awareness of reading strategies escalate as well [57]. The finding also shows that

appropriate instruction for using MALL can be helpful in managing the well-being of the users to benefit from MALL-based learning environments [58].

It should also be noted that using the application amplified the participants' motivation in reading, as MALL-based environments are shown to improve learners' positive attitudes towards and perceptions of language learning while less cognitive task load is experienced [59]. This proposition is in stark contrast to mixed findings in the literature concerning cognitive load management in the RSVP learning environments [49]. In point of fact, it supports more recent revealing insight concerning how the task load may become less as a result of the appropriate use of this technology [48] and that RSVP does not divert the concentration and attention of the readers from the text. Instead, as Reading Trainer Application helps readers to concentrate upon smaller units of the language while reading, bottom-up information processing speeds up and that in its own right would heighten more focused text analysis and ultimately more strategy use.

This finding also corroborates what others have suggested concerning the incorporation of apposite technological tools and applications into reading instruction that induces a higher degree of comprehension and employment of strategies [56], as students' comprehension of content knowledge and concepts may have been facilitated through graphic illustrations on screen [56].

In order to assess the magnitude of the intervention's effect, the effect sizes were calculated (Table 3). Interpreting the values of the eta squared indicated a substantial effect for improving MARSIR in general (eta squared=.42>.14). It was also revealed that among the effect sizes for categories of MARSIR, the effect size for SRS (.43) was the largest, suggesting a more potent effect for the intervention to improve SRS at the end of the experiment when compared with GRS and PSS. SRS or *support reading strategies* "provide the support mechanisms or tools aimed at sustaining responsiveness to reading" [50]. These strategies include taking notes while reading; reading aloud to help the reader understand what is being read; discussing what was read with others to check one's understanding; underlining or circling important information in the text, and using reference materials such as dictionaries to support the reading task. It is evident in the literature on traditional reading that readers who experience reading from papers use support strategies less than other types of strategies [51]. Unlike traditional reading, reading by technology promoted the awareness of SRS. The reason for this finding can be first and foremost related to the use of mobile technology while reading that eases the process of applying other supportive resources within the MALL environment. One such environment is social media, via which collaboration and cooperation are enhanced through sharing the ideas online. Further, online or mobile dictionaries can be easily used to check the problems the readers have while reading by using Reading Training Application.

From a technological point of view, support reading strategies are vastly pertinent to reading speed, eye movement, and time-lapses while reading. As RSVP technology and reading speed are associated, the

implementation of Reading Training Application improved the utilization of such strategies more in comparison to the other two types of strategies. RSVP technology is capable of lowering the amount of time demanded planning or eye movement, which, in turn, induces a more effective RC process in a way that comprehension is not interrupted [60]. It has been postulated that natural eye movements are ineffective, the reason being that the readers tend to move their eyes in less insignificant forward saccades and more recurrent regressions than required in regular reading [61]. While employing RSVP, the reader's speed enhances since the reader will use the foveal region (the center of the visual field) to read the highlighted words at a given instant [62].

This, in turn, augments concentration and eschews digressions that ultimately lead to the more frequent deployment of support reading strategies. According to HeKu IT, the developer's official website, users of the trial software have reportedly augmented their reading rate by an average of 143% within ten days.

The findings of the study support what is reported by other researchers, revealing that efficient eye movement, as well as eye movement training, empower readers to foster their reading skills [63] and oral reading fluency [64]. Also, it overshadows what is formerly found about the adverse effects of RSVP in deploying reading strategies [37].

Table 1: Descriptive statistics of MARSIR and its three categories (pre- and post-tests).

| Variables | Administration | Mean | SD |
|-----------|----------------|-------|-------|
| MARSIR | Pretest | 3.584 | 0.592 |
| | Posttest | 4.040 | 0.452 |
| GRS | Pretest | 3.406 | 0.829 |
| | Posttest | 3.900 | 0.627 |
| PSS | Pretest | 3.681 | 0.678 |
| | Posttest | 4.109 | 0.542 |
| SRS | Pretest | 3.666 | 0.610 |
| | Posttest | 4.112 | 0.551 |

Table 2: The results of paired samples t-tests.

| Comparisons | | Paired Differences | | | | | t | df | Sig. |
|-------------|-------------------|--------------------|--------|-----------------|---|--------|--------|----|-------|
| | | Mean | SD | Std. Error Mean | 95% Confidence Interval of the Difference | | | | |
| | | | | | Lower | Upper | | | |
| Pair 1 | MARSIR (pre-post) | -0.455 | 0.5410 | 0.066 | -.0588 | -0.322 | -6.840 | 65 | 0.000 |
| Pair 2 | GRS (pre-post) | -0.493 | 0.671 | 0.082 | -0.658 | -0.328 | -5.977 | 65 | 0.000 |
| Pair 3 | PSS (pre-post) | -0.427 | 0.771 | 0.094 | -0.616 | -0.237 | -4.498 | 65 | 0.000 |
| Pair 4 | SRS (pre-post) | -0.445 | 0.521 | 0.064 | -0.573 | -0.317 | -6.942 | 65 | 0.000 |

Table 3: Effect sizes for intervention on MARSIR and its categories.

| Comparisons | Eta squared | Magnitude of effect |
|-------------------|-------------|---------------------|
| MARSIR (pre-post) | 0.42 | strong |
| GRS (pre-post) | 0.35 | strong |
| PSS (pre-post) | 0.13 | medium |
| SRS (pre-post) | 0.43 | strong |

IV. CONCLUSION

The current study, as one of the pioneers in the arena of integrating RSVP technology into EFL classes, aimed at examining the effect of using Reading Training Application on EFL learners' reading strategies awareness and use. The findings revealed that using the application in reading instruction enhanced strategy use and awareness.

What is found attests that the integration of RSVP technology into mobile phones, as an irrefutably prominent device amongst language learners, is a practical means to facilitate reading comprehension by enhancing learners' metacognitive awareness of employing reading strategies.

This facilitates the use of other MALL-environments and affordances to support the reading process and lowering the nuisance of reading comprehension in a foreign language.

V. FUTURE SCOPE

It is suggested that further studies are required to be performed on the same topic through triangulating quantitative and qualitative data. Qualitative data can be gathered through interviews and think-aloud protocols to unveil the underlying reasons why reading by RSVP technology enhances the repertoire of strategy use and awareness among EFL learners.

One line of research should also focus on monitoring the readers' performance during reading by using eye-tracker devices to be able to analyze eye movements more rigorously through the output data.

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