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The Dynamics of Multimodal Literacy Development: The Tunisian EAP Context as a Case Study

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Abstract

The present study aims to explore the dynamics of multimodal literacy development in English for Academic Purposes (EAP). Ten Tunisian PhD students from the field of management participated in the present study. They displayed disparate features (visual proficiency, background knowledge and attitudes to verbal and visual modes). The participants were requested to perform three tasks based on a research article (RA) gauging visual comprehension and design skills. The present study demonstrates that, while performing the tasks, the participants construe meaning out of the multimodal text from purely visual data and from the combination of modes. The participants are also required to cope with the divergence in the realization of meaning across the verbal and visual modes. Therefore, the present study argues for the combined use of the theories of functionalism, genre analysis and the social semiotic theory of the grammar of graphical design for the identification and classification of these skills that enabled the study participants to perform the tasks.

The results of the study have revealed that multimodal literacy in EAP is an interactive process involving a dynamic dialogue between the participants and the multimodal RA. Participants with different features (background knowledge, visual proficiency, attitudes to the modes) displayed distinct abilities at coping with the cognitive requirements imposed by the multimodal text.

Keywords: EAP, Functional Grammar, grammar of visual design, genre analysis, Multimodal literacy, design, reading

1. Introduction

This study is situated within the Tunisian EAP (English for Academic Purposes) context. In this academic context, English, originally a foreign language in undergraduate and graduate curricula, emerges as the most important language for the acquisition of academic literacy in graduate levels. Therefore, Tunisian MA and PhD students are required to read and write research articles (RAs) and other genres in English in order to have access to advanced knowledge in their field and to gain visibility in the scientific community (Flowerdew, 2000). Since scientific knowledge is not exclusively mediated through the language mode but the integrated use of language along with tabular, graphical and mathematical resources, Tunisian EAP practitioners, in congruity with literacy

requirements worldwide, are confronted with the challenge of coordinating information in different modes to make meaning out of multimodal genres.

In order to have access to meaning-making procedure as Tunisian EAP researchers tackle multimodal genres, the present study proposes to administer reading and design tasks based on a RA in English to ten PhD students from the field of management. The aim of this is to explore multimodal literacy development in this academic context. It hypothesizes that this literacy development is conditioned by the ability to develop meaning out of purely visual data as well as through the combined use of modes (for instance, the verbal text, title, caption and the visual graphs). The present study postulates that the development of multimodal literacy is an interactive process that entails a dialogue between the features of the multimodal text and those of the participants (visual proficiency and reading/design strategies), who may display different abilities at coping with the challenges that the reading and design tasks impose.

More precisely the study aims to address the following issues:

1) How do the study participants orchestrate modes for the construction of meaning out of the multimodal RA?

2) How do participants' features such as, visual skills and reading/design strategies affect their performance in the multimodal tasks?

3) How do the features of the multimodal RA interact with participants' features to shed light on the dynamics of multimodal literacy development?

2. Literature Review

It is widely acknowledged that scientific genres are expanded to include verbal, non-verbal, linear and non-linear modes of representation co-deployed to form coherent genres loaded with meanings not possibly expressed relying solely on one mode. The literature is replete with studies that describe how meaning is realized through the orchestration of modes in several scientific genres (Johns, 1998; Lemke, 1998; Miller, 1998; Rowley-Jolivet, 2002).

Multimodal research connected with literacy and education has also stressed the multimodal nature of literacy. This research falls into two directions: research focusing on the norms of visual design in academic genres and studies exploring multimodality in educational settings and learning situations. The first direction focused on the principles of visual design through providing manuals that specify the norms of visual design in academic genres (Ackerman, Pitman, Pushkal, & Wendt, 2012; Bailey, 2003; Burnett, 2005). They focused on the principles of clarity, precision and fluidity in visual design. These studies, however, remain descriptive situated within the prescriptive tradition. Because these studies are specifying the norms of visual design on a general basis, they fail to portray how actual reader with specific skills and strategies cope with the generic conventions on visual design. Studies on the principles of visual design evoke the presence of a writer and a reader: a writer who designs visuals according to pre-established norms to convey meaning and a reader who constructs meaning out of semiotic signs. This approach is speculative because it presupposes the presence of 'ideal' readers and writers who have the skills that enable them to design and understand semiotic codes. Except for a few studies focusing on undergraduate education (Brugar, Roberts, Jiménez, & Meyer, 2018: Hobbs & Frost, 2003; Johns, 1998; Kachorsky, Moses, Serafini, & hoelting, 2017), research on the principles of visual design does not acknowledge that the visual sign is the projection of reader/writer features and intentions; a guiding principle in social semiotic theory (Kress, 2010; Kress & van Leeuwen, 2006). Very few studies have actually tackled the issue of intentionality from an empirical perspective to investigate the impact of reader/writer features, attitudes and strategies on their ability to construct meaning out of visuals.

The studies adhering to the second direction (multimodal educational settings) point out to the fact that a shift in the paradigms of representation and communication in contemporary heterogeneous societies have induced a reshaping of meaning-making resources in classrooms (Bezemer & Kress, 2016), turning them, thus, into 'multimodal sites' (Bourne, Franks, Hardcastle, Jewitt, Jones, Kress & Reid, 2004. p. 13). In this context, meaning is expanded beyond the modes of written and spoken language to include several signifying resources such as room layout, teacher movements, visual display, gestures…etc. Both teachers and learners in language and science

classrooms present knowledge through the orchestration of several modes as meaning resides in the simultaneous use of all modes (Kress, Jewitt, Ogburn & Tsatsarelis, 2001; Bourne et al, 2004). The proliferation of modes of knowledge representation has challenged the status of verbal literacy 'as the sole, the main, let alone the major means for representation and communication' (Kress, 2003, p. 27). Thus, the narrow monomodal definition of literacy materialized in the ability to communicate verbally has been substituted with 'multimodal literacy', which is broadly equated with the ability to make meaning out of several semiotic resources in many learning contexts (Jewitt & Kress, 2003).

The above-mentioned studies have provided a review of state of the art of multimodality in contemporary classrooms. They remain, however, descriptive product-oriented focusing on students' semiotic signs as materialization of cognitive procedure and affective choices without having access to this procedure. These studies are informed by the principles of the social semiotic theory in their argument that the semiotic choices simultaneously translate the intentions of the sign-makers and project culture-specific values (Kress, 2010). Conversely, being, most often, centred on western contexts of literacy development, they failed to put the general principle of cultural projection into evidence (Lim, 2018). They failed to show concretely how learner features such as visual skills and background knowledge as well as the general literacy context can affect meaning-making from multimodal resources.

The present study aims to address this particular issue. This study is anchored in social semiotic research and acknowledges the centeredness of the principle that the reader/writer is an active sign-maker (Kress, 2010). Therefore, it argues that the role of the reader/writer as sign-maker can be better understood through engaging him/her is real meaning-making situations (see also Alyousef, 2013; Lim, 2018). Through concretely reporting how EAP researchers with different features tackle multimodal tasks based on a RA, the present study tries to capture how they construct meaning through the interactive use of text and visuals. Being grounded in an EAP context, this study argues that meaning-making out of multimodal text in this context entails distinct cognitive requirements from undergraduate learning contexts. They include genre awareness, as well as knowledge of domain-specific representational and interactional meanings and awareness of the meaning potential of text and visual modes; how each mode realizes meaning in its specific way (Liu, 2009).

The present study starts from the two following premises:

- the complexity of meaning-making that requires the intricate orchestration of modes,
- the difficulty to have access to the cognitive procedures EAP practitioners employ to deal with multimodal tasks especially that they are not always consciously available to the researcher.

Confronted with these challenges, the present study argues for the relevance of linguistic and semiotic theories, namely functional grammar, grammar of visual design and genre analysis in capturing the EAP participants' skills that enabled them to perform the reading and design tasks and, thus, to make meaning out of multimodal artefacts. These theories can help in the identification and classification of the skills that enable the participants to perform the reading and design tasks.

3. Theoretical Framework

The present study is guided by the principles of the social semiotic theory—a theory that draws chiefly upon the ground-breaking work of Michael Halliday (1978), in which he outlined the major principles of SFL as a social semiotic theory. Rooted in this theory is that language is a "semiotic act or an act of meaning" (Halliday & Webster, 2003. p. 355). Language is a set of linguistic events that convey meaning in context. The idea that the semiotic sign is produced in context refutes the structuralist view adopted by De Saussure (1916), which introduces meaning as a static entity embodied in the semiotic sign- a fixed and arbitrary association between a signifier and a signified. Accordingly, Halliday substituted the semiotic sign with the semiotic resource, which has a potential of meaning dictated by the culture and exploited by the sign-maker to instantiate meaning (Halliday & Webster, 2003) in accordance with context. Halliday and Matthiessen (2004) argue that context comprises three categories (field, tenor and mode) encompassed under the concept of register. Field refers to discourse that realizes the "institutionalised activity that is going on"

(Martin & White, 2005 p. 27), mode refers to the channel of communication and tenor to social relations.

This view on the relationship between the semiotic resource and context are embraced by Kress and van Leeuwen (1996) in the semiotic theory of the Grammar of Visual Design (GVD), in which they argued that the semiotic act is realized by verbal language and other semiotic systems like visuals and gestures. The present study draws upon the semiotic theories of SFL and the Grammar of Visual Design and argues that the visual designer exploits the semiotic resources available in context (Kress, 2010). Therefore, visual design reflects register in terms of field (the institutionalised requirements of the scientific community), tenor (relations between members within discourse community), and mode (the features of the written RA genre).

It has been shown above that the present study argues that meaning-making is a semiotic act in context and this view is grounded under the theoretical underpinnings of social semiotic theories. The present study is also deeply anchored in the social semiotic theories of SFL and GVD in their meta functional analysis of language and other semiotic systems. Kress and van Leeuwen (2006. pp. 42-43), who are deeply influenced by Halliday's (1978) meta functional analysis in SFL, argue that the semiotic codes fulfil three social functions and offer an array of possibilities for their realizations. The visual codes offer a multitude of choices for the representation of objects in images and the interaction between them (representational function). The designers of semiotic codes employ a multitude of choices relative to the interaction between the producers of images and their receivers (interactional function). Likewise, the semiotic codes depict the organization of information in a coherent pattern (compositional function). SFL and GVD have been widely used and proved efficient in the analysis of academic discourse and visual discourse respectively (Brett, 1994; Gardner, 2012; Hyland, 2013; Lemke, 1998; Swales, 2004). The present study argues that these theories can be efficiently exploited to understand and have access to multimodal literacy skills which are, otherwise, not always consciously accessible to the scrutiny of the multimodal researcher/teacher.

More concretely these frameworks served the two following functions:

(1) The participants' performance in the study tasks is the materialization of the intricately complex cognitive procedure involving orchestration of modes and a dialogue between participants' strategies and multimodal artefacts. This procedure is, however, not consciously available to the researcher unless overtly stated by the participant. Through associating each difficulty with skills required to answer it drawing upon the linguistic and semiotic theories mentioned above, it is possible to have access to the skills used by the participants to deal with the tasks.

(2) While performing the tasks, as in many genres and literacy situations, the participants coordinate modes (visual and verbal) and semiotic resources (colours, bars, percentages…etc.). In this meaning-making endeavour, the participants should develop the awareness that each mode has a meaning-making potential, or affordance (Kress, 2010; Kress et al, 2001) and therefore contributes to meaning in its specific way. The theories above mentioned are used to analyse different semiotic resources in the different design tasks. This analysis highlights the specificity of meaning realization across modes.

A brief description of the relevance of the different theoretical frameworks to the present study is undertaken in the following sections.

3.1 Grammar of Graphical Design

The grammar of visual design is a social semiotic theory that draws upon Halliday (1978) and views that different modes are exploited by the sign maker to convey meanings echoing both the intentions of the sign-maker and the culture-specific values (Kress, 2010). Therefore, Kress and van Leeuwen (2006. pp. 42-43) argue that the semiotic codes fulfil three social functions and offer an array of possibilities for their realizations. The visual codes offer a multitude of choices for the representation of objects in images and the interaction between them (representational/ideational function). The designers of semiotic codes employ a multitude of choices relative to the interaction between the producers of images and their receivers (interactional/interpersonal function). Likewise, the semiotic codes depict the organization of information in a coherent pattern (compositional/textual function).

In the present study, the grammar of visual design is used to classify the different clues that

can be employed by the study participants to master the different difficulties of the reading and design tasks. These clues are divided into representational, compositional and interactional skills. (This is described in details in the sections entitled requirements of the tasks).

In parallel, the visual used in the tasks were extensively described using this framework. Focus is laid on the realization of the representational, interactional and compositional functions. The aim of this description is to explore the impact of the divergence in the interactional, compositional and representational features of the visuals across the tasks and difficulties on participants' performance.

3.2 Functional Grammar

Functional grammar argues that language realizes three basic functions; an ideational, an interpersonal and a textual. In the ideational function, language is a means of representing the world (Bloor and Bloor, 1995). The system of transitivity is the grammatical resource that realizes this function through a configuration of process, participants and circumstance (Halliday & Matthiessen, 2004. p. 175). The interpersonal function of language serves an interactive function. Mood and modality are among the grammatical resources that help realize this function (Halliday, 1985). The textual function of language deals with the organization of information in a clause.

Functional grammar is exploited in this study to describe the realizations of the ideational, interactional and textual function in the verbal discourse (cross references, the verbal input in the tasks and the text describing the content of the visuals). Thanks to the parallelism between functional grammar and the grammar of visual design, the comparison in meaning realization across the modes can yield reliable results This comparison can highlight the differences in meaning potential or affordance across the verbal and visual modes to point out to the potential challenges the reader/designer are required to cope with when performing tasks requiring the integration of the two modes.

3.3 Genre Analysis

Genre is a focal concept in Systemic Functional Linguistics and genre analysis studies in EAP. Despite the controversies between these approaches, there is an overall agreement between them that genres are "staged, goal-oriented social processes which integrate field, mode and tenor choices in predictable ways" (Martin, 1993; p. 103). Focusing on the conventional nature of the rhetorical organization of the RA, Swales (1990; 2004) argues that this genre displays an IMRD (introduction, methods, results, discussion) division, in which each rhetorical section is divided into distinct moves that are realized by specific generic features. Despite the fact that several verbal aspects of the RA have been acknowledged as highly conventionalized by a body of research (Brett, 1994; Swales, 1990; 2004; Williams, 1999), research on the generic conventions of several aspects of visual discourse (the nature, concentration of visuals and CRs (cross references), and the nature of intermodal connections across rhetorical sections) are very scarce. The present study draws upon the general principle of conventionality in the RA genre and aims to probe the study participants' awareness of the generic features of visuals and CRs across the rhetorical sections, as depicted in the RA upon which the reading and design tasks are based, and the effect of this awareness on their performance.

4. Methodology

This section introduces the participants' features, the tasks and the data analysis methods.

4.1 Participants

Ten PhD students from the field of management belonging to the two subfields of marketing and strategic management participated in the study. The participants belonging to the sub-field of strategic management were identified from S1 to S5 while those belonging to marketing were identified from M1 to M5. They were required to answer a questionnaire and then perform reading and design tasks.

The questionnaire was administered as a self-assessment measure of the participants' visual proficiency relative to different visual types (tables, graphs, models…etc) and different visual components (visual, title, caption… etc). Using the questionnaire as a self-assessment procedure is supported by the literature. Henerson, Morris and Fitz-Gibbon (1987) suggest that self-assessment is used when the researcher assumes that the respondents are aware of their own attitudes and abilities and are able to evaluate them accurately. According

to their self-assessment in the questionnaire, the participants were divided into distinct levels of visual proficiency. The study aims to gauge the impact of visual proficiency on the performance of the participants.

The questionnaire also aimed to probe the participants' attitudes to visuals and verbal discourse and their strategies when dealing with them; whether they prioritize one mode over the other or they use them conjunctively to develop meaning out of multimodal genres.

In order to focus on the impact of visual proficiency on participants' performance, the effect of other variables was controlled. Therefore, the participants constituted a homogeneous group. They were Tunisian students who were native speakers of Arabic. All the participants were enrolled in a PhD Program. They had a similar educational background. They learned English as a foreign language in secondary education and within an ESP (English for Specific Purposes) course at university level. The subject-specific courses in both secondary and university levels were taught in French. However, most of the references the participants read during the preparation of their MA and Ph. D dissertations were in English. As to visual design, the participants confirmed that had a broad idea about visual design within a course on data analysis.

4.2 Corpus

The reading and design tasks were based on a RA from the field of marketing dealing with measurement models misspecification. This article was published in 2003 in the academic journal: *Journal of Consumer Research (JCR)* qualified by the authors as "representative of the best journals in marketing literature" (Jarvis, Mackenzie & Podsakoff, 2003. p. 206). In addition to its scientific quality, this RA was selected for the following reasons:

- In this study, the researcher has opted for tasks based on a RA rather than on context-free matching or design tasks in order to engage the study participants in authentic literacy practices. Therefore, the participants will develop meaning out of the RA through the integrated use of visuals and verbal data. By performing reading and design tasks based on a RA, the participants should be aware of the generic constraints on the nature of visuals and CRs across the rhetorical sections.
- This RA was selected because the nature and number of visuals are suitable for the reading and design tasks. Nine visuals are included in this RA divided into five figures and four tables. The figures include four transactional models and a graph.

4.3 Tasks

In designing the test batteries, the researcher took into consideration that the tasks requirements matched with the literacy practices in the academic context. The participants of the study engaged in reading and design tasks requiring the participants to understand the communicative value of visuals (transaction, classification, comparison, …etc) as well as how the visual mode interacts with other semiotic resources such as the verbal text, titles subtitles, captions for meaning realization and expansion. This assumption is anchored in the literature, which argues that the integrated use of the verbal and the visual contributes to the expansion of meaning in science (Lemke, 1998). The tasks were based on a RA to test the participants' awareness that both the communicative value of visuals and modal connections are bound to generic constraints.

4.3.1 Reading Task

All visuals were taken out of the RA, which originally included nine, and a symbol was attached to each blank space the visual used to occupy. Three of the removed visuals were selected along with three parallel ones selected from other RAs dealing with the same research topic. Titles, subtitles, and caption were removed and scrambled along with the same components of the three parallel visuals. An A3 sheet was divided into three parts. The six visuals were put onto the first part, the scrambled titles, subtitles and captions onto the second part. A symbol was attached to each visual, title, subtitle, and caption. For the third part of the sheet, the researcher devised a table in which the participants should provide their answers. After a scanning of the RA, the participants were requested to identify the visuals originally belonging to the RA and match each visual with its title, subtitles and caption. Then, they should restore it into the RA.

The aim of this task is to show that developing meaning out of the research articles is dependent on combining several semiotic resources mediated through the verbal and visual modes (the verbal text, caption, title and

subtitle along with the visual graph or model). For instance, to identify and insert the visuals, the reader should understand the visual, link it with its description in the text and associate it with a specific section in the RA.

4.3.2 First Design Task

In this task, a visual was taken out of the RA and was converted into a table containing the same data. The participants were required to suggest a more appropriate representation relying on the text and table (see Appendix A). The visual designed should conform to the communicative value of the original visual.

4.3.3 Second Design Task

A visual was removed from the RA and a few of its components were removed. The content of the visual was summarized in a list of sentences. The participants were required to complete the visual with reference to the text and sentences in the instructions (see Appendix B). The aim of the task is to test participants' ability to design a visual that conveys meaning and takes into considerations the distinctiveness in the realization of meaning across the modes.

4.4 Data Analysis Methods

In the analysis of participants' performance, two methods were taken into account. A quantitative analysis relying on descriptive statistics was adopted to probe the participants' performance. It aims to make connections between participants' features and the number of correct answers. The main analytical framework was qualitative. In each task, an in-depth analysis of the performance of two participants displaying disparate features was undertaken. The performance of the participant is evaluated against the task requirements that were outlined drawing upon the theoretical frameworks of functional grammar, grammar of visual design and genre analysis.

In addition to the analysis of the participants' performance, the qualitative analysis relied on the description of participants' behaviour and strategies during the performance of the tasks. Added to this, the participants were invited to provide a feedback about their performance after each task. In the present study, descriptions and feedback were used to capture aspects of the reading comprehension and design processes that could not, otherwise, be unveiled in the end product form through the answers provided by the participants.

5. Results

This section reports the participants' performance in each task. The analysis of each task is divided into two parts. In the first part, the tasks were divided into component difficulties and each difficulty is associated the clues required to master it drawing upon linguistic and semiotic theories. The second part describes the participants' performance.

5.1 First Reading Task Requirements

Figure 1, figure 3 and table 4 were taken out of the RA. Figure 1 and figure 3 are transactional models. Table 4 comprises a combination of verbal and numerical data. The mastery of the different difficulties entails generic, representational, compositional and interactional skills. The generic skills require making connections between the rhetorical section and the visual. The mastery of the representational functions of visuals requires drawing connections between key words in the article and visual/title/ subtitles. It involves making interactions between transactions in the visual and description in the text/caption/subtitles. The interactional skills entail making connections between interactional devices across the modes. Compositional skills require associating the description of visual organization in the text and its actual organization.

As stated in the objectives, the present study postulates that the development of visual processing skills is an interactive process involving a dialogue between the features of the participants and those of the visuals. The identification and placement of the different visuals impose distinct cognitive demands upon the reader. Depending on their visual skills, the participants may demonstrate different abilities at coping with these demands. The differences in cognitive requirements are due to variation in difficulty at the following levels:

-the generic features of visuals: they refer to the rhetorical section in which the visual is situated,

-the features of CRs across the rhetorical sections and the degree of overlap between text and visual,

-the representational, compositional and interactional features of visuals and the similarity/divergence in meaning potential across the modes (visuals and language),

At the generic level, figure 1, figure 3 and table 4

belong to two distinct rhetorical sections which are the theoretical (figure 1) and the results (figure 3 and table 4). The features of CRs constitute a challenge. The first CR to figure 1 introduces the main purpose of the visual: "key features of the two models are summarized in Figure 1." (Jarvis et al, 2003. p. 200). Added to this, the CR to this visual includes clear hints to its organization: "this is indicated in the first column of figure 1, in which each uni-dimensional construct is represented by a circle with several arrows emanating from it to a set of indicators" (Jarvis et al., 2003. p. 200). The CR to figure 3 displays the features of CRs in the result section. It provides general insights into results and refers to the visual for details and illustration. This CR also requires background knowledge of key concepts, notably "Monte Carlo Simulation". Another difficulty in this CR is that it is removed from the visual. Due to generic considerations, the CR to table 4 is similar to that of figure 3 in voice and verbal process, "table 4 shows the goodness of fit indices for correctly and incorrectly specified models" (Jarvis et al., 2003. p. 212).

The ability to understand information display within the visual code may also account for participants' performance. Figure 1 comprises two transactional models involving transactional relationships between participants (construct measure and error type). In the two models, a bidirectional transaction allowed by the bidirectional organization of the visual is displayed (between construct and indicator and between error and indicator).

The ability to disentangle representational relationships is even more challenging in figure 3 as it conveys more complex relationships. The transaction between participants is multidimensional. These transactions display mode-specific patterns. The connection between latent variables is typical of conversion processes (Kress & van Leeuwen, 2006. p. 68). The two participants alternate roles as actor and goal as Figure 1 demonstrates.

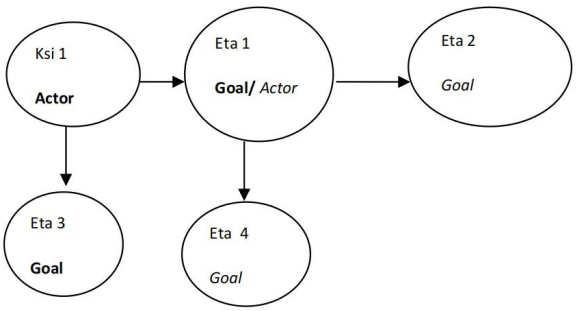

Figure 1. Transactional Relationships in Figure 3

Note: Ksi: Latent variable, Eta: Latent variable

In table 4, the representational process in table 4 is conceptual denoting a stable state of affairs. The visual fits more particularly into the symbolic process. The two categories of symbolic process (symbolic suggestive and symbolic attributive) are displayed in this table thanks to its bidirectional organization. The symbolic suggestive process represents "what a participant means or is" (Kress & van Leeuwen, 2006. p. 105). It identifies models in terms of the position of constructs and fit indices levels. The symbolic attributive process is realized basically at the vertical level where a comparison between different types of correctly and incorrectly specified models is undertaken in terms of position of construct, correlation levels and goodness of fit indices.

5.2 Participants' Performance in the First Reading Task

The quantitative analysis of participants' performance indicates the strong impact of visual proficiency (see Figure 2). This effect was particularly associated with visual placement, identification of titles and captions. The effect of visual skill was particularly highlighted in representational and generic skills and was less pronounced in compositional skills. Topic familiarity coupled with visual proficiency accounted for the good performance of S5 and M4.

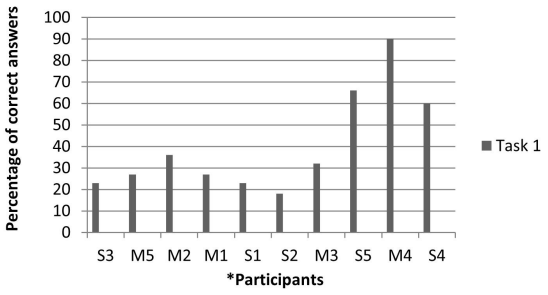

Figure 2. The Participants' Performance in the

Reading Task

Note: *The participants are displayed in ascending order according to their self-assessment of visual skills

In the following section, a deep examination of the performance of two participants with disparate visual skills was undertaken. M2 self-assessed her visual-reading and writing skills as fair. In the questionnaire, she maintained that she was more skilled with the visual components containing verbal data namely captions, footnotes and CRs (good) than with the visual component with fewer verbal data like diagrams and graphs. S5, the second participant, self-evaluated his visual reading skills as very good. As to reading strategies, he asserted that he relied on the interaction between text and visual to develop an understanding of visual data.

This discrepancy in visual proficiency was echoed in their performance. Numerically, S5 outperformed M2 in all the difficulties. This discrepancy was particularly clear at the title and caption identification as well as the placement of visuals. It was less clear in identification. Reading strategies coupled with the distinct cognitive requirements in the mastery of difficulties accounted for this.

M2 adopted non-interactive reading strategies. She dealt with the text and visuals as separate sources of information. She discarded the text when referring to the visual and vice versa. This strategy affected her identification skills. She identified the initial visual in the RA as well as another transactional model. M2 undertook surface associations between key words in visual components and the text. This deficiency was attributed to hasty, non-interactive reading of the CRs. The participant mixed similar visuals. She mistook F2 for table 4 instead of F4. This error could be attributed to surface associations between key words in the table chosen (fit indices) and the same words in the CR of table 4. S5 made more thoughtful associations between text and visual and managed to draw connections between key words across the modes. Therefore, he managed the identification of all the visuals.

The placement of visuals imposed different cognitive challenges upon the two readers. S5 coped with the challenges successfully and monitored reading strategies according to the requirement of the difficulty. He mastered a combination of generic, representational and interactional skills and showed the ability to simultaneously connect clues between text, visual and caption. M2 adopted ineffective reading strategies built on hasty and superficial associations. The performance of M2 was affected by her reading strategies. She failed to deal with the text and visual simultaneously. She read the text preceding and following spaces with no reference to the visual to discard the text altogether and refer to the visuals for a brief examination. This non-interactive reading strategy led to a local reading. She managed the placement of figure 1. The placement of this figure did not constitute a distinctive factor due to the generic features of the visual mentioned in the previous section. Because the participant consulted the text separately from the visuals, a memory loss attendant to the time interval between the reading of the text and visuals may occur. This may explain her failure to place visuals in the results section. Figure 3 was placed as figure 5 due to the similar organization of the two visuals into panels and the transactions they display. This hasty association also indicated that M2 undertook a superficial and partial reading of the CR to figure 5. Throughout the CRs to figure 5, there was clear evidence that the visual was divided into four panels as in "see panel 4 Figure 5" (Jarvis et al., 2003. p. 215) unlike figure 3 which included three panels.

In the identification of titles, the performance of M2 was characterized by opting for general titles that echo the surface associations between key words in the title and text. In figure 1, she opted for "structural equation models in experimental research" instead of "differences between types of measurement models". The identification of the title of figure 1 required an interaction between the CR "key features of these two models are summarized in figure 1" (Jarvis et al, 2003. p. 200) and the key words in the title T3 "a summary of differences between types of measurement models". Because M2 relied on the visual and title only for the identification of the title and discarded the text, she failed to find the title. S5 made thoughtful associations between text, visual and titles.

M2 identified one subtitle and one caption. Her errors highlighted her failure to connect the text with the visual. She reversed the order of the subtitles of figure 1. She also made hasty

associations between visual and caption and reversed the captions of figure 1. S5 was able to place the subtitles of figure 1 and subtitle 1 of figure 3. He actually asserted that he was able to associate the subtitles with figure 1 relying on the transactions and his background knowledge of models even without referring to the text, but he complained that when the transactions became more complex as in figure 3, he wanted to rely on the text but the text did not include pointers specifying the positioning of the different models. The identification of subtitles of figure 3 entailed an interaction between key words in the visual and text. To identify subtitle 1, the participants were required to draw connections between the key words across two sentences in separate sections in the text. Thanks to his familiarity with the topic, S5 mastered this difficulty.

S5 mastered the interactional skills pertaining to the association between the key word "bold" in the caption and the bold in table 4. He equally mastered the captions comprising verbal data (figure 1) as well as those including numerical ones (figure 3).

After performing the task, M2 asserted that she considered visual and verbal data as separate sources of information. The fact that the task imposed combination of the modes was challenging for her and could not deal with them simultaneously. The identification and placement of the first visual was not difficult because the visual was easy to understand. On the contrary, the identification of subtitles and captions was very difficult because she could not capture the link between the visual and these elements.

S5 asserted that he was comfortable with the task because it was based on a RA within his research area (the participants used the analytical model mentioned in the RA in his research). He believed that the visual elements and the text represent complementary information and the combination of them helped him perform the task. The placement of figure 3 was the most problematic for him. He asserted he automatically skipped irrelevant spaces such as the CR to table 1 because it referred to a table as a visual type and that of figure 2 which contained reference to "second order" not included in figure 3. The participant complained that the CR did not include descriptions of transactions in the visual. He undertook a close interaction between text and visual and managed the placement. He also asserted that he undertook a thorough reading of the different spaces, which enabled him to place table 4 in the results section.

5.3 First Design Task Requirements

This task was based on a graph from figure 4 in the RA. This bar graph comprises a combination of verbal and numerical data. Each graph contains an axis of abscissa indicating the percent relative bias and whether it is positive or negative and an axis of ordinate indicating the different categories of structural parameters (Gamma 11, Gamma31, Beta 21 and Beta 41) along with four sets of bars occupying the interior of the graph. Each set contains three bars in different colours to designate the percent value for the different models (Model A, Model B and Model C) (see Appendix A).

The original figure condenses several representational processes and displays several compositional structures. The designer was required to disentangle the meaning functions of the original visual through reliance on the RA and the table (see Appendix A). Simultaneously, s/he was supposed to cope with the divergence in the realization of meaning across the three modes.

The representational function is realized by means of conceptual patterns. This structure fits into the symbolic category. Actually, the two subdivisions of the symbolic process namely the symbolic attributive and the symbolic suggestive are displayed in this visual. The symbolic attributive function involves two or many participants and the identity of one participant is established in relation to the other participants (Kress & van Leeuwen, 2006. p. 105). This process is realized between structural parameters for the same model (see Appendix B).

At a lower level, the symbolic attributive function is realized between models within the same structural parameter. In the text, this comparison function is undertaken within the same sentence according to the left right logic of the mode. This sentence "measurement model misspecification *suppresses* estimates of gamma 11, negatively biasing the estimates by 88% in model 2A 89% in model 2B, and 93% in model 2C" (Jarvis et al., 2003. p. 211) (emphasis added) highlights the realization of this process in the text. In the graph, it is realized on a vertical pattern according to the top/down and

down/top logics. The different models are represented in the form of bars positioned one above the other (see Appendix A)

The representational structure also fits into the symbolic suggestive category: a percent relative bias is attributed to each model (Model 2A/2B/2C). This symbolic suggestive function is equivalent to the relational attributive processes employed in the text. This meaning is realized in the text through a configuration of carrier and attributes and circumstances (Halliday and Matthiessen. pp. 211-212) as example 1 shows

(1) Estimates of Beta 21 | are | positively biased | 555 | in model 2A

Carrier **Process** **Circumstance** **Attribute** **Circumstance** 2

The same meaning is realized in the graphs through using bars with different, lengths and colours (see Appendix A). Meaning is expressed linearly in the text and bi-directionally across the axes of the graph. The axis of ordinate, which identifies the structural parameters, is equivalent to the carrier in a clause. The axis of abscissa, which indicates percent bias, is equivalent to the modifier with a circumstantial meaning "positively", "negatively". The length of the bar, which denotes the value of percent bias, is equivalent to the attribute in the text whereas the different colours used to delineate the different models are equivalent to the circumstance "in model 1A".

The table, sentence and graph comply with mode-specific patterns. The designer was confronted with the challenge of disentangling the differences in meaning potential across the modes. In the table, only negative values are marked. The graph exploits its bi-directional organization to represent both values: from 0 to right to indicate positive bias and from 0 to left to designate a negative one. In example 1 above, the modifier "positively" is used to convey the same meaning. In the table in Appendix A, the connection between the variables is not clearly displayed. In the sentence, it is clear through its hierarchical organization that the structural parameters dominate the models. The same relationship is displayed in the graph through positioning the structural parameters and models respectively on the axis of ordinate and the interior of the graph. In the table, the different variables are clearly distinct and positioned in the column head (model), header row (structural parameter) and cell (attribute/ value). The same principle applies to the sentence. While the table complies with the bi-directional logic, the sentence complies with the linear one. The distribution of information in the graph complies with mode-specific patterns. Meaning is realized through reliance on different semiotic systems. A single bar realizes simultaneously the circumstance meaning (in model) through the use of colours and the attribute meaning through the use of bar length.

5.4 Performance in the First Design Task

Visual proficiency had a relatively significant impact on the variation between the performances of participants. The variable effect was manifested at all the levels of meaning making and it was especially clear at the interactional level. The participants with good visual skills managed to differentiate the different variables using colours and shapes. Within the same vein, the effect of visual skills was consistently displayed at the interactional and the symbolic attributive levels to be reduced at the symbolic suggestive level.

Below is a detailed description of the performance of two participants with disparate visual skills. S1 self-evaluated her visual skills as good and she asserted she was more comfortable with visuals displaying qualitative data. The representations introduced by S1 demonstrated her good visual skills. The participant was first hesitant. She first suggested three graphs that represented different models. Afterwards, she decided that the variables could be grouped into one graph and suggested a bar graph and then changed her mind and opted for a dot graph (see Figure 3).

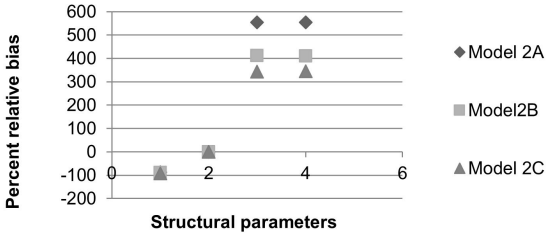

Figure 3. The Representation Suggested by S1 in the First Design Task

This representation was in congruity with the

original representation at the three levels of meaning-making. At the representational level, all the levels of the representational process were represented. The percent relative bias was correctly identified and the comparisons between models were highlighted within each structural parameter. At the compositional function, the different layers of organization were realized. The direction of organization was partially shifted but without affecting the meaning. At the interactional level, different colours were used to differentiate models. The main weakness was the fact that the dots did not facilitate the comparison between models within structural parameters especially when the values of percent relative bias were identical or similar.

S3 self-assessed her visual skills as poor and asserted her difficulty to find the appropriate visual type and the connections between variables within visual data. In this task, she suggested a visual that displayed transactional relationships emanating from the actor "model" towards the goal "structural parameter". Her representation confirmed her suggestion in the questionnaire concerning her difficulty to choose the appropriate visual type.

After finishing the task, S1 asserted that the table used in the task clearly shows a comparison between models. Yet, this visual form does not display the comparisons very clearly. She thought that a graph can show comparisons much clearly. She, however, asserted that at the beginning she found it difficult to design a visual that groups the different variables (models and structural parameters) and that shows positive as well as negative values.

S3 was, on the contrary, satisfied with the table as it grouped the different variables. When the researcher enquired about the choice of the transactional model, the participant suggested that there were software programs that dealt with structural equations and they usually displayed data in a model format. This indicated that background knowledge played a negative role because this key word "structural equations" induced a short circuit hypothesis. Relying on background knowledge about the concept, the participant made a hasty deduction about the type of visual that should be used without undertaking a closer reading of the text and the content value of the visual as depicted in the text and the table in the instructions. The text depicted relational processes that could not be translated into a transactional process. As the following sentence indicates "Estimates of γ 31 are positively biased 488% in model 1A, 384% in model 1B et de 335 % in model 1C". (Jarvis et al., 2003. p. 211).

5.5 Second Design Task Requirements

The task was based on table 2 in the RA. The table comprises numerical data. It classifies models according to whether they are correctly or incorrectly specified as formative or reflective (see Appendix B). The designer was required to complete the table in conformity with the functions depicted in the original table. To do so, s/he should refer to the RA and instructions. At the same time, s/he needed to cope with mode affordance distinctiveness. The representational process in this table is conceptual. The representational structure in this table is symbolic. Both levels of the symbolic process, namely the suggestive and attributive are displayed (Kress & van Leeuwen. p. 105). The symbolic suggestive process is realized at each row. It describes the percentage of correctly and incorrectly specified reflective/ formative models. It is equivalent to the relational attributive process in sentences (Halliday & Matthiessen, 2004. p. 211). The two modes exploit different resources to convey similar meanings. The meaning is expressed in a linear pattern in the text according to the order of carrier, process and attribute. Example 2, which displays the same syntactic structures as the sentences in the RA, shows this:

(2) 810 out of a total of 1,146 | were | reflective constructs | correctly |

Carrier (1) / Circumstance1 Process Attribute (1) Circumstance1'

X | modelled | as having reflective measure.

Attributor Process Attribute (1')

The display of data in the table follows a non-linear multidimensional pattern. The attributes (modelled as reflective/ modelled as formative) occupy a header row position

whereas the carriers (810 and 336) are postponed to the interior of the table. The attributes "should be reflective" "should be formative" occupy the column heads. Table 1, which depicts row 1 and column spanner 1 from table 2 in the RA, report the realization of the representational function in this mode.

Table 1. Realizations of the Representational and Compositional Functions in Table 2

	Overall		
	Should be reflective **Attribute 1'***	Should be formative **Attribute 2**	Total
Modeled as reflective **Attribute 1/2'** ***Theme***	810 **Carrier 1** ***Rheme****	336 **Carrier 2** ***Rheme***	1,146 **Circumstance 1** ***Rheme***

* The items in bold indicate the distribution of participants at the representational function.

** The items in italics indicate the distribution of information at the compositional function.

The thematic structure displays mode-specific patterns. The points of departure of the table are bi-directional in the form of column heads and header rows. This table displays a marked thematic structure because the attribute components constitute the point of departure of the table. The attributes "reflective" and "formative" positioned in the header row and "should be formative/ reflective" in the column head signal the point of departure of the table while the carrier elements like "810" are placed in the interior of the table (see Table 1).

At the interactional level, a few devices are employed to attract the attention of the reader. Italics are used for journal titles. Percentages are put between parentheses. This table is also marked by a mood choice in the form of the modal adjunct "should be" expressing probability.

The sentences in the instructions and table 2 (see Appendix B) impose different reading paths and display distinct information structure. To read a single row in the table, the reader is required to follow a non-linear complex reading process moving from right to left (from the cell denoting the total to the header row denoting model specification as formative or reflective and then to the two column heads to indicate whether the construct is correctly or incorrectly specified. Example 3 portrays the way the linear reading of such a sentence is transferred into a multi-layered reading in the table.

(3) For all the journals, out of 1,146 constructs modelled reflective, 810 were correctly modelled,

(Column spanner) (From the cell of the total to header row) (From cell to column head)

Top right-left down-top

The symbolic attributive process is realized through the comparison between reflective and formative constructs follows the same pattern across the modes. Example 4 from the instructions (these sentences displayed similar syntactic structures to the sentences describing the results of table 2 in the text) show that the underlined attribute elements change across the sentences.

(4) For all the journals, out of 1,146 (96%) constructs modelled reflective (A), 810 (68%) were correctly modelled (B), 336 (28%) should be formative (C).

For all the journals, out of 46 (4%) constructs modelled formative (A'), 29 (3%) were correctly modelled (B'), 17 (1%) should be reflective (C').

The challenge that the participants encounter is that, unlike the sentences where the labels of the attribute elements can be changed across the sentences, in the table the column heads should be fixed while they apply to the two rows (see Appendix B). The attributes "correctly modelled" (B B') referred to different constructs (reflective and formative). The attributes "formative" and "reflective" (C C') differed across the sentences without affecting their

grammaticality and content value. In the table, one label in the column head that applies to the two rows is needed. The epistemic modal "should" is used to meet the affordance of the tabular mode. So, the label of the first column head "should be reflective" applies to the first row to indicate the constructs correctly modelled reflective and should be reflective and applies to the second row to indicate the constructs incorrectly modelled formative and should be reflective (see Appendix B).

5.6 Performance in the Second Design Task

In this task, visual proficiency was a strong predictor of the participants' performance. This effect was particularly significant in the mastery of column heads and header rows. This variable was insignificant in the mastery of numerical data. At the level of meaning functions, visual proficiency exerted a strong influence on the mastery of the symbolic suggestive function but was insignificant in the mastery of the interactional function. All the participants, except M4, were unsuccessful in this function.

Focus is now laid on an in-depth examination of the performance of two participants with disparate visual skills. M4 managed eight out of nine difficulties, while M2 managed one difficulty. M4 was advantaged by her superior visual skills and topic familiarity (her PhD was related to the topic of the RA) and, accordingly, mastered several layers of meaning in conformity with the original visual. M2 was handicapped by her poor visual skills. She made local design and only managed the numerical component of the table. Weaknesses pertaining to local design characterized her performance. M2's design of the two column heads applied to the first row only. The first and second column heads were respectively labelled "correctly modelled" and "formative". These labels applied to the first row, which indicated that the participants failed to represent the symbolic attributive function of the table through comparing the constructs modelled reflective versus those modelled formative and, thus, failed to find column heads that applied to both rows. To do this, the participant should be able to dissociate the logics of the sentences from that of the table. While the order of words can be shifted across the sentences, the column heads are fixed. She also failed to associate the third column head and the third header row with the total. This knowledge could be mastered by making connections between the key word in the sentences "out of" and the total in the table.

M4 was able to master the symbolic suggestive and attributive functions of table 2. She managed the symbolic suggestive function relative to the ability to designate header rows as representing reflective/ formative constructs. This mastery was equated with the ability to differentiate the left/ right affordance of sentence organization from the non-linear and two-levelled organization of the table. It was also associated with the ability to identify the attribute function of the header row. Her mastery of the symbolic attributive function relative to the comparison of constructs modelled reflective and those modelled formative through the addition of the epistemic model "should" was indicative of the combined influence of visual skills and background knowledge.

After the task, M2 asserted that the task was challenging for her because it required the transfer of sentences into a tabular form. Though, she was aware that they communicate information in different ways, she could not find how to translate this when completing the table. All she could do was to make sure to insert the data mentioned in the sentences in the table. M4 asserted that she could not insert the information in a linear way into the table and she had to distribute the information between column heads and header rows. Then, she checked whether the table reported the same results as the instructions

6. Discussion

Representation in science is irrevocably marked by the proliferation of modes. The literature abounds with descriptive studies that explored the contribution of the combination of semiotic resources to the advancement of representation in scientific discourse (Lemke, 1998; Miller, 1998; Rowley-Jolivet, 2002). This interest was not paralleled by studies exploring multimodal literacy in educational contexts. The present study has conducted an empirical case study rooted in the Tunisian EAP context to explore the dynamics of multimodal literacy development. Ten participants from the field of management displaying different visual skills were requested to perform three tasks that aimed to gauge their visual-reading and design skills.

The present study has tried to prove that the development of multimodal literacy is an

interactive process involving a dialogue between reader/writer features and the features of the multimodal RA (see Figure 4).

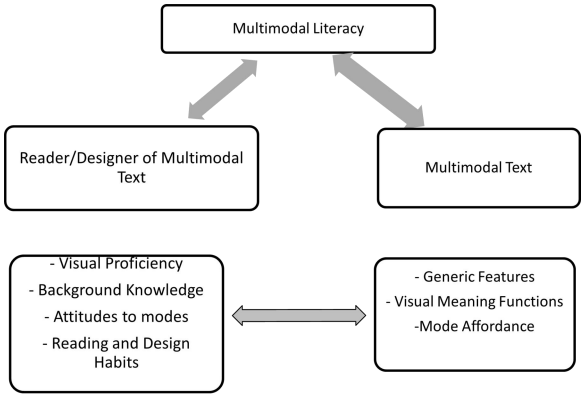

Figure 4. A Model of the Dynamics of Multimodal Literacy In EAP

This interactive nature of multimodal literacy is validated by the fact that a few participants in this study failed to perform the tasks because of their poor multimodal literacy skills and were, accordingly, unaware of the features of visuals and the principles of verbal-visual interconnection in the multimodal RA genre. The present study argues for the urgent need to promote multimodal literacy skills in the Tunisian EAP context so that researchers could develop a thorough understanding of the research RA, a genre where meaning is realized through the orchestration of the verbal and visual modes. Since its advent by Jewitt and Kress (2003), 'multimodal literacy' has, however, been used as a cover term referring broadly to the ability to 'communicate effectively through multimodal representations' (Lim, 2018). The present study posits that the concept of multimodal literacy should be narrowed down to a set of skills tightly associated with specific genres and registers. The present study proposes a set of skills necessary for developing meaning out of the multimodal RA genre. They are divided into:

- Generic skills,

- The ability to determine visual meaning functions,

- And the ability to disentangle affordance across the modes.

Generic skills relate to the ability to determine generic conventions that equally affect the verbal and visual layers of discourse as well as how the modes are interconnected. This can be summarized into the following component abilities:

- the capacity to find visuals belonging to the RA and to discard irrelevant visuals,

- the ability to design visuals that are appropriate for the academic article,

- The ability to identify the features of visuals and CRs (type, concentration, grammatical realization, and display of information) across the rhetorical sections. This skill is crucial for a correct insertion of visuals into their original places in the RA.

- And the ability to determine the way the modes interconnect across the rhetorical sections. For instance, the interconnection between modes in the results section is marked by a brief statement of general tendencies and a reference to the visuals for a detailed display.

The development of multimodal literacy depends on the participants' recognition of the visual meaning functions as developed by Kress and van Leeuwen (2006). They include:

A/ representational skills: they converge to the participants' awareness of the resources used by the designer for "representing aspects of the world." (Kress & van Leeuwen, 2006. p. 42). They are manifested at the ability to disentangle the differences between visuals depicting narrative processes and others depicting conceptual ones through connecting information within visuals and across the modes.

B/ interactional skills: they involve the participants' awareness of the semiotic resources like colours, shapes and salience devices employed to "project the relations between the producer of a (complex) sign, and the receiver/reproducer of that sign". (Kress & van Leeuwen, 2006. p 43).

C/ compositional skills: they entail recognizing the various layers of organization in a visual (vertical versus horizontal organization and bi-directional versus linear organization).

The present study has demonstrated that, during the performance of the tasks, the participants relied on several modes that have different resources and logics of representation (words versus space, linear versus multi-levelled). Since the different modes exploit their specific resources for meaning construction, successful meaning construction depends, to a large extent, on awareness of mode affordance. The participants have to cope with the

divergence in the logic of representation across the modes so as not to impose the logics of the verbal mode on the visual one.

7. Conclusion

The quantitative analysis of participants' performance indicated that the participants with good visual skills performed significantly better than those with poorer visual skills in all the tasks. The effect of the variable was particularly significant in the mastery of generic and representational skills in the reading tasks and the representational and compositional skills in the design tasks. The study reported discrepancies in participants' performance at the qualitative level. In the reading tasks, participants with good visual skills adopted interactive reading strategies that culminated in a global reading and an ability to disentangle different types of clues extended over several sections of the RA. Participants with poor visual skills adopted non-interactive reading strategies that resulted in a linear reading, the mixture between similar visuals and the inability to disentangle compositional and generic clues. In the design tasks, participants with good visual skills managed several layers of meaning realization in conformity with the original visual. Participants with poor visual skills made hasty deductions that resulted in erroneous representations and local design. The results also indicated a dynamic interface between reader/designer features and the features of the multimodal text. Participants with good visual skills managed to cope with the distinct cognitive challenges across the difficulties and were aware that the text and visual had distinct logics of representation. On the contrary, participants with poor visual skills were only successful with the easiest difficulties (the placement of visuals with introductory CRs in the reading task as well as the difficulty involving numerical knowledge in the design task). They were unsuccessful in disentangling the affordance of the verbal and visual modes and imposed the logics of the verbal on visual data.

By means of engaging readers/ writers with different features in real meaning-making situations requiring the orchestration of verbal and visual modes to develop meaning out of the RA genre, the present study has demonstrated the central role of participants' features in their abilities to deal with the RA as a multimodal artefact. The present study has also demonstrated that meaning-making out of the multimodal RA involves a complex set of procedures and several abilities. The present study argues that, given the weaknesses in participants' performance in the tasks, the teaching of visual reading and design should be systematically implemented into the EAP curriculum to promote the skills mentioned in the discussion section. This implementation can follow a multileveled process starting with low level thinking skills like the description of visuals in academic genres to culminate in promoting higher level thinking skills such as visual design (see Moalla, 2016).

The present study has tried to explore the dialogue between reader/ designer and multimodal text to shed light on the dynamics of visual literacy development. The results remain limited because they are derived from a small-scale exploratory study, which makes it difficult to make generalizations. The results are also confined to the Tunisian literacy context. Future studies can compare the development of multimodal literacy across cultural backgrounds and educational contexts.

Declarations

Availability of Data and Materials

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

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Appendix A: First Design Task

Figure 4 from the RA introduces the percentage of percent relative bias for standardized structural parameters estimates (Gamma 11, Gamma 31, Beta 21, Beta 41) for mis specified models in endogenous position (2A. 2B 2C). This table contains data in figure 4.

Table A1. Percent Relative Bias in the Unstandardized Structural Parameters in Model 1 in Endogenous Position

	Model 2A	**Model 2B**	**Model 2C**
Gamma 11	-88	-89	-93
Gamma 31	0	0	0
Beta 21	555	411	343
Beta 41	554	410	344

You are required to

1. Design the most appropriate visual that can represent these data.

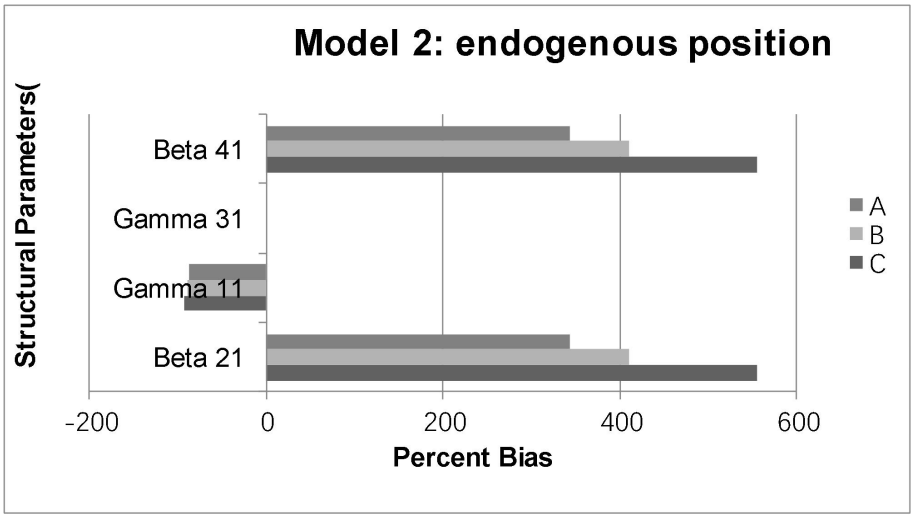

Figure A1. Percent Relative Bias in the Unstandardized Structural Parameters Model 2 in Endegenous Position (Jarvis et al, 2003. p. 211).

Appendix B: Second Design Task

The sentences below contain data originally included in table 2 in the Research Article (see Jarvis et al, 2003: 206-207). They report a summary of correctly and incorrectly specified constructs in marketing literature across the four leading journals.

* For all the journals, out of 1,146 (96%)

constructs modeled reflective, 810 (68%) were correctly modeled, 336 (28%) should be formative.

* For all the journals, out 46 (4%) constructs modeled formative, 29 (3%) were correctly modeled, 17 (1%) should be reflective.

Complete the following table.

Add a title.

Add a caption.

Table B2 Percentage of Journals Correctly and Incorrectly Modeled in Marketing Literature (Jarvis et al., 2003: 206)

	All journals*		
	Should be reflective	**Should be formative**	**Total**
Modeled reflective	810 (68)	336 (28)	1.146 (96)
Modeled formative	17 (1)	**29** (3)	46 (4)
Total	827 (69)	365 (31)	1.192 (100)

() Percentage * the items in bold are the deleted items in the task.