VirtualCruiseTour: An AR/VR Application to Promote Shore Excursions on Cruise Ships

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Abstract. This work presents VirtualCruiseTour, an AR/VR-based application dedicated to ship cruises' guests for the promotion of organized shore excursions. It can be exploited also in travel agencies to showcase future customers the sites of interest that can be visited during the cruise. The AR module allows augmenting a map showing the cruise route, the ship current position and the ports in which the liner will stop. Tapping one of the port (or the ship), the user is shown more details about the shore excursions organized for that stop (or the ship facilities) and has the chance to experience the site of interests watching 360° pictures or videos either in an immersive (VR) or non-immersive mode. A pilot study to validate the application as a marketing tool is foreseen. The experiment evaluates the customers' purchase intentions and their knowledge of the product in comparison to traditional marketing media (web sites and brochures). Preliminary results of the study conducted enrolling nine participants are presented and discussed.

Keywords: Augmented reality · Virtual Reality · Tourism · Marketing

1 Introduction

The use of Virtual and Augmented Reality (VR/AR) in the tourism field represents a topic of growing interest for both researchers and companies [1]. Due to their characteristics and their capability of entertaining the users, in fact, AR and VR have found different applications within this sector, such as enhancing the touristic visits [2], increasing the accessibility of fragile or remote areas [3], educating and guiding the tourists [4] and broadening the global interactions among travelers [5].

Indeed, the potential of VR and AR applications can be exploited also to promote trips to specific destinations, thus influencing travelers' decisions with the final aim of increasing the visits of certain sites [1]. Being aware of this, tourism companies are trying to enhance visual representations – that are currently the main means to promote tours – by introducing VR/AR technologies in their marketing campaigns. In this way, in fact, they can provide the potential customers with the possibility to experience a virtual world and to "feel present" in another place (i.e. with immersive environments), thus helping them in making more informed decisions and creating realistic expectations

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on how the real experience would be [6]. Moreover, recent studies reported that the common audience has become more resistant towards traditional visual media as sources of information [7], and thus it is plausible to hypothesized that only information conveyed in an innovative way and within an enriched-data context are capable of captivating new potential customers. AR and VR may represent a solution to this issue, also taking into consideration that, nowadays, making use of VR/AR have become widely accessible, thanks to the new generation of mobile devices supporting these technologies and the diffusion of low-cost devices for the visualization of 3D and VR content as the CardBoard.

In this context, VR and AR-based marketing tools can be helpful for travel agencies, to incentivize the purchase of specific holiday packages, and they could represent a key marketing element and value proposition also during the travel, when the guests of a cruise liner are offered to buy one or few-day excursions to interesting sites nearby the ship port [1].

In this work, a mobile phone-based application dedicated to cruise ships' guests for the presentation of the excursions offered in each port is presented. *VirtualCruiseTour (VCT)* exploits both AR and VR to provide the end user with information about the cruise's route, the excursions proposed at each stop and immersive experiences in the sites of interests that can be visited – through organized excursions – during the vacation. Besides, it offers the opportunity for travel agencies to show in advance to potential customers the ship features, the different typologies of staterooms and of the places that can be visited during the whole cruise tour. In this way, future tourists can make their decision while being aware of how the real future experience will be.

One of the aim of this work is to evaluate whether AR and VR technologies provided by the VCT application can be effectively used as marketing tools to promote shore excursions to cruise passengers, investigating their purchase intentions and consumer learning compared to traditional marketing media (brochures and web pages).

2 Related Works

As already mentioned, VR and AR technologies have great potential as promotional instruments to encourage customers to visit a specific destination or purchase a service. In recent years, several examples of application have been presented both in the scientific literature and, especially, in the commercial scene.

In the former area, Fritz et al. [4] introduced the PRISMA project, which foresaw the development of an application dedicated to cultural tourism; their system, based on a video see-through device, exploits AR to enhance the real scenes by multimedia personalized interactive information, such as text, photographs, maps, video and 3D reconstructions. In 2015, Kourouthanassis et al. [8] developed and tested on the field a mobile augmented reality (MAR) travel guide, which supports personalized recommendations while visiting the Greek isle of Corfu. Martinez-Grana et al. [9] developed a virtual tour for a natural park, using geological layers and topographic and digital terrain models that can be overlaid in a 3D model. They used augmented reality to

allow the users to access these georeferenced thematic layers and overlay data, in real time, on their mobile devices.

Dealing with the use of VR, some examples may be represented by the works of Potter et al., who developed a VR experience in a nature based environment [10], and Lee et al. who reconstructed five Korean heritage sites to allow visitors to see them as they originally were in ancient times [11].

In the field of marketing products, Hilton [12] and Marriot [13] – two of the major hotel brands – offer to visit their facilities and some of the cities in which they have accommodations, through immersive experiences that can be experienced using Cardboards. Moreover, many countries, cities and heritage sites have developed their own virtual or augmented tour to promote their visits. Among these, South Africa [14], London [15], the Duomo of Milan [16], the Quirinale palace in Rome [17].

Although there are not many works investigating the role that VR and AR-based technologies have in tourism marketing, several authors analyzed the effects of these technologies in marketing strategies. Bulerca et al. [18], despite highlighting the scarceness in benchmarks, examined the benefits for brands and companies deriving from the adoption of AR technologies and AR Experiential Marketing by testing them in a focus group. The results of the study underlined the perceived benefits of AR technologies, such as an impression of timesaving, sense of playfulness while using the technology and satisfaction. Furthermore, trustworthiness and reliability of the brand adopting AR technologies has emerged as one of the most relevant element of the brand attitude. Nah et al. [19] conducted a study to assess whether telepresence provided by 3D environments could enhance or deteriorate the brand equity and found these types of environment can indeed increase the brand equity by offering immersive and enjoyable VR-supported experiences. Several researches also showed that telepresence provided by VR technologies can positively influence consumers' knowledge of a product [6], as well as consumers' brand attitude and purchase intentions [20, 21]. With regards to the tourism marketing, in 1995 Williams and Hobson [22] stated that VR applied to tourism marketing has "the potential to revolutionize the promotion and selling of tourism". For instance, it has been proved by Wan et al. [23] how VR is a more powerful advertising tool than brochures for the promotion of theme and natural parks. Several researches suggested to incorporate AR and VR technologies into tourism website to provide a more effective advertising techniques [24, 25].

3 The VirtualCruiseTour Application

The main aim of VCT is supporting the promotion of one-day organized shore excursions in the ports where the cruise ship stops. It is dedicated to cruise liner's guests who can book these trips on-board being aware of what they will visit. As a secondary aim, VCT can act as a marketing tool to be used both on the cruise and in travel agencies to showcase the shore excursions available for each destination; it offers the possibility to potential customers to see in advance which will be the sites of interests along the cruise route.

VCT relies on both AR and VR; when used in the AR mode, it augments a map showing the cruise route and stops. If the user is on-board, he/she can also see the ship

position and data dealing with the covered distances, traveling times, current velocity, etc. While in this mode, the cruise stops are highlighted and the user can select one of the augmented ports to discover which are the sites of interests and the shore excursions that can be made. When a site is selected, the user can consult written description and/or choose to explore cultural and natural sites of interest through 360° videos and pictures either while using the mobile in a classic mode, or wearing a CardBoard to experience the proposed sites in an immersive way.

The application has been developed to run on Android and iOS smartphones for several reasons. First, being the cruise customers the main target, it can be supposed that almost everybody owns his/her own device. Thus, neither the ship owners, nor the travel agencies are committed to buy special AR/VR equipment in order to provide all the passengers with the VCT application. Finally, the majority of smartphones supports the VR modality – the screen splitting in two halves – that, coupled with biconvex lenses (e.g. cardboards lenses), allows the user to feel immersed in a virtual world. These lenses, conversely to AR/VR equipment, can be provided to the cruise guests with a small economical effort: it is enough to think that Google Cardboards are sold for $7. In addition, they can be customized with the company logo for further marketing purposes.

VCT has been developed using Unity 3D to exploit its ability to target the developed application to multiple platforms (Android, iOS).

3.1 The Application Workflow

The VCT application is characterized by the two different modules: the AR module and the 360°/VR module (Fig. 1). The AR module allows the user to select a port to access more information about the nearby sites of interest. In addition, the interface shows – while on-board – the cruise liner's current position and some details about the itinerary and the ship itself. Once the user has tapped a port, he/she is provided with an interface where to select the site of interest to be explored with 360° videos or pictures. The user can then tap on one of the site of interest to access these multimedia contents either in an immersive or non-immersive way.

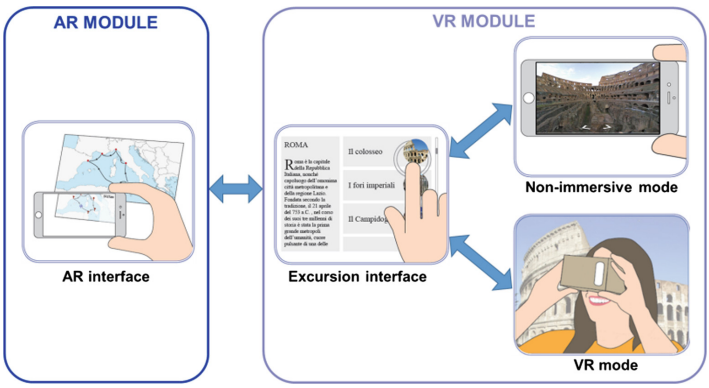

Fig. 1. The application workflow.

An important requirement that was taken in consideration in the design phase of the VCT application was the possibility for the ship owners or the travel agencies to easily modify or add new multimedia contents, especially when dealing with 360° pictures and videos. To do this, an external configuration file, easily modifiable by non-programmers, has been used.

The AR Module

The AR module has been developed in Unity 3D using Vuforia, a Software Development Kit (SDK) designed to integrate AR in mobile applications [26]. The AR module has been built using a marker-based approach; with this approach, when a marker (typically an ad-hoc 2D image) is framed with a camera, it is recognized by the application and used as reference system to place and orient the virtual content to be superimposed onto the real world.

The marker chosen for the VCT application is a map showing a cruise route in the Mediterranean Sea (Fig. 2). At the application launch, the user's smartphone camera is activated, so that when the user frames the map, the augmented multimedia contents appear superimposed on the map. The position of the ship along its route and each stop of the cruise, are displayed as icons, which can be interacted by tapping them. Moreover, the user can access augmented contents showing real time information about the cruise route and the ship, such as speed, covered distances and traveling times. All these pieces of information are retrieved in real time using a client-server architecture; the cruise ship position is interpolated along the route starting from covered distance data.

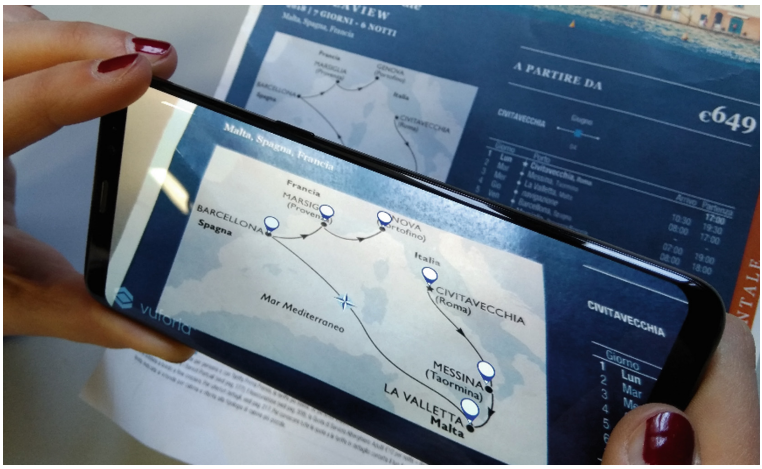

Fig. 2. A user experiencing the AR interface of VirtualCruiseTour.

The VR Module

When the user taps an AR interactive icon, a new interface (excursion interface, see Fig. 2) providing a brief description of the shore excursions (or the ship) and a list of

buttons showing nearby sites of interest (or the cruise ship facilities) is shown. 360° pictures or videos associated to the site of interest (or to the ship) can be further accessed by tapping one of the buttons. At this point, the user can choose to visualize the multimedia content using two different visualization modes:

- Non-immersive: with this mode, the user can explore the 360° view of the multimedia content by orienting the smartphone in different directions or by dragging the content with a finger on the screen.
- VR: in this case, the user has to put the smartphone inside the cardboard provided by the ship owner. He/she can then explore the sites of the excursion or the ship facilities in an immersive way, by moving his/her head.

The user can switch from the non-immersive to the VR mode, and vice versa, respectively by tapping on the screen or pointing the gaze toward a designated button.

3.2 The Customization and the Accessibility of Media Contents

As mentioned before, particular attention has been dedicated to the flexibility of the VCT application after its deployment. The ship owners or the travel agencies must be able to easily modify the multimedia contents (360° photos or videos) without accessing the source code. To reach this goal, an external XML-based configuration file containing all the relevant information about the media contents has been used.

Media contents can be either stored locally and, thus, downloaded with the VCT application, or downloaded in real time. A control algorithm prevents the visualization of buttons – that are instantiated dynamically – associated to online contents when internet connection is not available. However, even without internet connection, users can still use VCT since it is provided with a set of pre-loaded contents (two lightweight multimedia contents for each site of interest or ship facility). Online contents that are changed after the download of the application (by modifying the configuration file) are made accessible through periodic application updates.

4 Proposed Validation

The validation proposed to test the effects of VCT relies on some basic assumptions. Firstly, the current state of the art of Virtual and Augmented Reality technologies allows the users to interact with representations of products mainly with two senses, vision and hearing. Secondly, VR is able to enhance telepresence [27].

Following the theoretical background provided in [20], the validation experiment relies on Vessey's Theory of Cognitive Fit [28]. According to this theory, there is a positive correlation between task performances and the modality with which the task is presented. Hence, a match between IT applications and users' tasks should be realized in order to promote better results. By applying this theory, Suh and Lee stated that products with attributes that can be experienced through Virtual Reality technologies benefit from an enhanced presentation to the consumers, since their salient attributes become completely obvious and apparent thanks to both visual and auditory cues [20].

Basing on this assumption, Suh and Lee classified products into virtually high experiential (VHE) and virtually low experiential (VLE). The former category indicates those products whose evaluation requires the consumer to exploit vision and hearing (i.e. paintings, clothes), while the latter describes products whose evaluation is best performed using other senses than vision or hearing (i.e. food, beverage).

4.1 Validation Goals

In this work, we reprise the classification of [20] with the aim of investigating whether the offer of cruises' shore excursions can fit the category of VHE – basing on the assumption that these products can be indirectly experienced by customers mainly through vision and hearing. As a consequence, it is plausible to hypothesize that consumers' purchase intentions are positively influenced by the use of AR/VR technologies.

On the other hand, it is also true that AR/VR still represent a novelty for the general public, thus inducing a "wow" effect (at least during the first experience) that can induce a sense of being engrossed, thus limiting the task performances and the learning of the proposed information [29]. Within this context, the aims of this work are therefore the testing of the following hypotheses:

(1a) shore-excursions are VHE, thus AR/VR technologies are able to increase purchase intentions;
(1b) sense of presence positively influences consumers' purchase intentions.
(2) AR/VR technologies induce a "wow" effect, during the first experience that limits consumers' learning.

4.2 Selected Product and Advertising Materials

The enrolled participants are shown advertising materials regarding a five-day long Mediterranean cruise starting from the port of La Spezia and reaching, in order: Marseille, Palma de Mallorca, La Valletta, Trapani and Civitavecchia (Rome). The materials provide information and details on a shore excursion in Rome that includes visits, among others, of four main attraction sites that will be the object of guided tours: the Colosseum, the Circus Maximum, St. Peter's Basilica and Caracalla's thermal baths. These four areas of interest are described with short text while the whole excursion is described with essential details, such as cost, duration, difficulty of the excursion (whether the excursion is suggested only for persons in a good shape or for any passenger, even in wheelchair) and possible in-excursion activities (possibility of lunch, local products tasting, shopping, etc.).

The shore excursion is described in three different types of advertising materials (Fig. 3):

(a) a tri-fold brochure describing the excursion and its interesting sites with two pictures for each site and a table summarizing the essential details (cost, duration, difficulty, possible in-excursion activities);

(b) a web-page containing the same text provided for the brochure and the same pictures, with a picture for each main attraction, a frame showing sliding pictures of the same sites and two frames illustrating 360° pictures for two monuments; the page is also provided with the same essential details of the brochure next to a "purchase" button;
(c) an AR/VR set composed of a Cardboard and smartphone running the VCT application; the content of VCT showcases the same sites of interest depicted in (a) and (b) using eight 360° pictures, but presents the same text used in the brochure and in the web-page.

Fig. 3. The three types of the provided advertising material: (a) the trifold brochure, (b) a screenshot of the web page and (c) the Cardboard, the marker and a smartphone running the VCT application.

4.3 Experimental Procedure

The experiment is aimed at investigating whether (1) the offer of shore excursions can be positively represented by AR and VR technologies, thus indicating that these products fit in the VHE category, and (2) the "wow" effect limits consumers' learning.

Participants enrolled in the study are randomly divided into three groups. The first group (A) is provided with a standard tri-fold brochure describing the product; the second group (B) is provided with a web page, while the third group (C) is provided with a Cardboard and a smartphone running the VCT application.

Before starting the experiment, each participant is presented the shore excursion to Rome as a facultative guided visit to the city that can be purchased while being a passenger on a cruise ship sailing in the Mediterranean Sea. Group C receives also a brief explanation of the functioning of the VCT application. This is made not to prevent the provision of specific information within the application; it is assumed, in fact, that all the subjects are familiar with both printed-paper and web pages, whereas they may not be so skilled in the experience of a mobile app presented them for the first time.

After a maximum of 10 min of exposure (subjects were told they could stop whenever they felt good with the information they had) to the specific media, the

participants are administered a questionnaire asking about personal information (age, gender, year of schooling, employment) and regarding the offer they learned about. In details, the questionnaire investigates the following outcomes:

- *Sense of presence*; presence is the sense of "being there" in an environment by means of a communication medium. Presence is mainly investigated in scenarios involving VR, however it can be elicited also by different media (as a book or a movie). Sense of Presence is investigated using the questionnaire developed by Usoh et al. [30]. Questions have been adapted to the context of this trial, modifying the term "office space", which authors used in their version, with "Rome's sites of interest/local attractions".
- *Perceived product knowledge*; three Likert-scale items, adapted from the questionnaire developed by Smith and Park [31], aimed at investigating how well the customer feel informed about the content of the excursion.
- *Mode of product evaluation*; this section contains two Likert-scale items which intend to investigate how much the quality of the product (i.e. the excursion) is evaluable from the experience provided by media (i.e. the brochure, the web page, VCT app).
- *Product attitude*; in this section, participants are asked how they feel about the product, using five 7-point Likert items (*bad/good, not appealing/appealing, unpleasant/pleasant, unattractive/attractive, boring/interesting*).
- *Purchase intention*; a 7-point Likert Scale question asks the participant if he/she would take into consideration to purchase the proposed excursion.
- *Actual product knowledge*; four open questions investigate the product information's retention by the subject. In details, the questions are about: the price and the duration of the excursion, the possibility for people with mobility issues to join it, and the main touristic attractions that will be presented through guided tours. These answers are rated 0, if the answer is wrong or not given, 1 if the answer is correct; for the last question, each correct attraction is rated 0.25.

At the end of this first step of validation, the participants of C group are asked to complete a questionnaire for User Interaction Satisfaction [32], aimed at evaluating their experience with the AR/VR interface.

4.4 Preliminary Results

At the moment of this publication, nine subjects (age: 35.5 $\pm$ 7.3; 6 males, 3 females; years of schooling > 18) have been enrolled among the employees of Italian National Research Council. No inclusion criteria were specified; exclusion criteria were severe visual impairment and inability to read or speak Italian language. All subjects gave their informed consent.

Task times were measured during each trial; results, reported in Fig. 4, showed an increase in the duration of the experience as the means become more interactable.

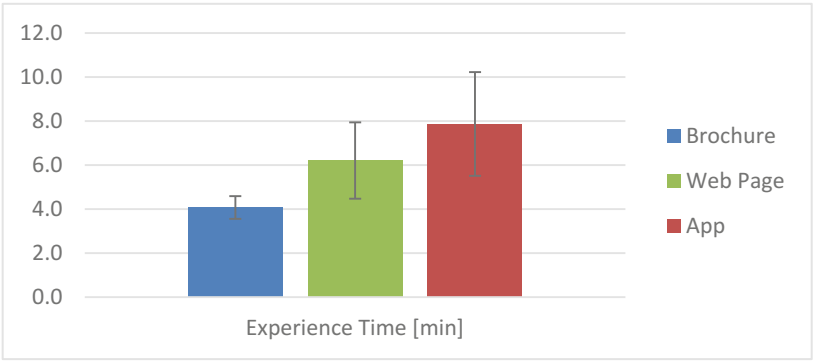

Fig. 4. Task duration for each group.

Sense of presence was unexpectedly found to be higher in the case of the brochure (3.5 ± 2.0) as shown in Fig. 5; VCT application elicited a sense of presence (3.2 ± 1.2) just a little higher with respect to the web page (3.1 ± 1.7).

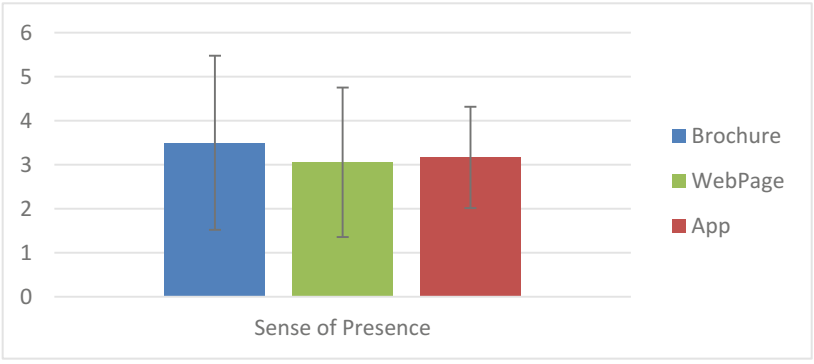

Fig. 5. Sense of Presence evaluated with Usoh et al. questionnaire [30]. Values are up to 7.

For *perceived knowledge*, the brochure (5.1 ± 1.3) was the means that made the consumers feeling more confident about the knowledge they acquired, both with respect to the web page (4.4 ± 1.9) and VCT application (4.3 ± 1.4). The evaluation of the product through visual means resulted more reliable in the case of the web page (5.2 ± 1.5); results obtained by the brochure (4.2 ± 2.3) and VCT application (4.3 ± 1.9) were comparable.

Dealing with the *product attitude*, VCR application received the best score (4.8 ± 0.7), the web page was rated 3.9 ± 1.7, whereas the brochure was the less appreciated with a score of 3.1 ± 1.8 (Fig. 6).

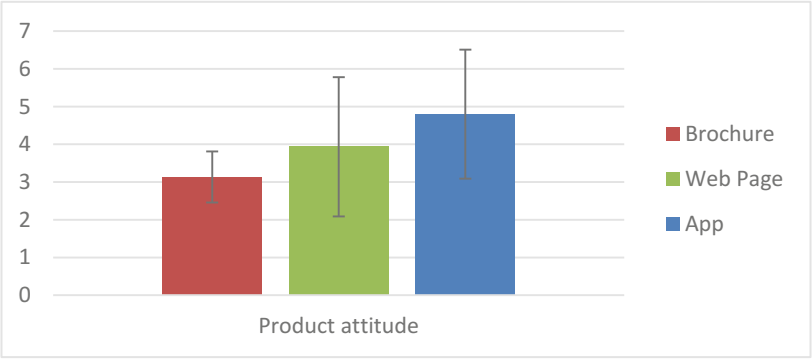

Fig. 6. Brand attitude: the subjects evaluated how much the product was good, appealing, pleasant, attractive and interesting on a scale 7 [31].

Purchase intentions were considerably higher in the case of VCT app: all subjects rated 5 their will to buy the shore excursion; the web page obtained a score of 4.0 ± 1.0, whereas the brochure caused the excursion to have a lower appeal (2.7 ± 2.0).

The *actual knowledge*, evaluated through four questions investigating information retrieval after the experience, resulted quiet high for the brochure (2.7 ± 1.2) and for the web page (2.7 ± 1.0), whereas in the case of VCT application, the score was lower (1.8 ± 1.0). Perceived and actual knowledge are compared in Fig. 7.

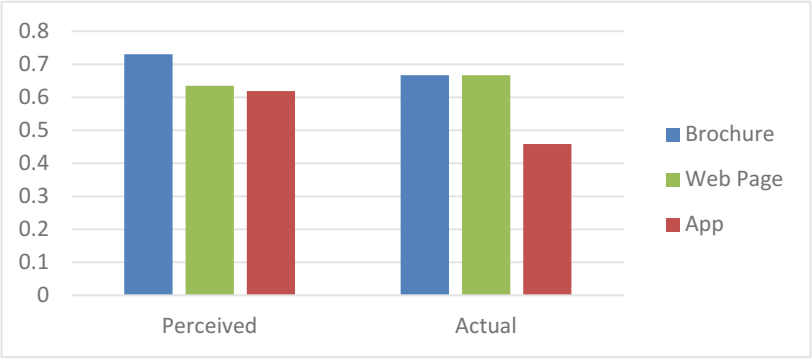

Fig. 7. Comparison between actual and perceived knowledge; values were normalized to ease the visual comparison.

Finally, the administration of the User Interaction Satisfaction questionnaire to the subjects enrolled in Group C resulted in a score of 6.4 ± 1.7. No statistical tests were run due to the small sample recruited up to the date of this manuscript preparation.

4.5 Discussion

VR and AR technologies are gaining more and more prominence during recent years and their application in the marketing field is growing proportionally; this tendency can be explained by the possibility, provided by these technologies, to experience a product before its purchase, alleviating consumers' lack of physical contact [20].

In this context, the preliminary results of the conducted study – though with several limitations – introduce some interesting findings. First, the time dedicated to the means' consultation was considerably higher in the case of the VCT application. This is undoubtedly due the time 'wasted' to insert the smartphone in the Cardboard and to the longer experience that the navigation in a 360° picture can elicit; however, it has to be noticed that the subjects were not required to look at all the media contents: it was therefore their choice to spend more time consulting several pictures. This outcome is in agreement with results obtained by Suh and Lee, who reported an increase in *flow* for all subjects experiencing either a VHE or a VLE product when the media was indeed VR [20]. Flow, firstly defined by Csikszentmihalyi, indicates a state of well-being in which people can be depicted as intrinsically motivated, unconscious of themselves while performing the tasks, and oftentimes losing the sense of physical time [33]; it is believed to be responsible of users' engagement and motivation: hence, the longer experience time may be the result of the generation of such positive mental status.

This fact is in agreement with the assessment made for product attitude (the VCT app was the most appreciated) and user satisfaction, but appears in contrast with the results obtained from the Usoh et al. questionnaire, aimed at evaluating subjects' sense of presence. The brochure resulted in fact as the media capable of eliciting the highest presence. However, this unexpected result can be explained because all the enrolled subjects, with the exception of one (in Group B) have already visited the city of Rome. This fact, which surely represent a bias in the sample, led the groups to perform an evaluation of the sense of presence basing on to two different principles: people in Group A and B answered the questions relying on the memories they had of the city which were recalled by the media contents, while Group C answered thinking more specifically of the application. This hypothesis is confirmed by some comments the subjects made during the questionnaire compiling; two subjects in Group A and B said that their memories were mixed with the real ones, while two subjects in Group C commented about features related with the application ('I would have liked to walk inside the sites', 'I did not feel so present because I could not focus images properly').

Another interesting observation that could be made by looking at the obtained results deals with the comparison of perceived and actual knowledge. The former resulted higher in the case of the brochure and comparable for the web page and the application. However, when evaluating the acquired knowledge, this resulted considerably lower only for the VCT app. This confirms – at least preliminarily – hypothesis (2), and goes in favor of the relationship between the onset of a "wow" effect that still emerges in the general public when it comes to VR/AR technologies, and the limitations in task performances, already noticed in previous studies [29, 34].

Nonetheless, purchase intentions were higher in Group C, meaning that the media could play an important role in the marketing field. Only one participants in Group C remembered how much the shore excursion would cost, but all voted 5 (up to 7) when

asked if they would consider to buy the proposed excursion. This result would suggest that perceived knowledge, together with the product attitude, the users' satisfaction and the flow, account for more when consumers' are proposed with a product – a shore excursion – to buy, making it a VHE.

As already mentioned, these results are only preliminary, and the presented study has several limitations. First, the sample was too small to draw any conclusion on the generalizability of the obtained results. In addition, all subjects were researchers, had a higher education degree and almost all have already visited Rome: these aspects may have biased also other results, different from sense of presence.

Therefore, before proceeding with the experiment, it is needed to increase the catchment area adding subjects with different age, years of schooling and profession; changing the city in which the excursion take place with a less-known one may also be of help to eliminate biases in sense of presence due to memory recall. The possibility to change the instrument used to evaluate sense of presence will also be taken into consideration: Usoh et al.'s questionnaire is in fact a brief set of question that results very useful not to lengthen too much the evaluation times, but, on the other hand, it does not address all the domains related to presence, as, for instance, the ITC-SOPI developed by Lessiter et al. does [35]. Thus, replacing the questionnaire with a more detailed one could help to increase the sensitivity of the instrument in detecting differences and in better addressing the motivation for a reduced or an enhanced sense of presence.

5 Conclusion and Future Works

This work presents an Augmented and Virtual Reality-based application, VCT, for supporting the promotion of one-day organized shore excursions in the ports where the cruise ship stops. VCT is dedicated to cruise liner's guests, who can experience in advance the sites of interests, in order to make a more informed decision before purchasing the organized trips. Moreover, the application can act as a marketing tool to be exploited in travel agencies with the aim of show-casing the shore excursions available for each destination and the ship liner's facilities. The architecture and the features of VCT are described, together with the experiment and its preliminary results to validate the marketing opportunities it can provide.

Future works for VCT foresee the deployment of the application and the conclusion of the validation experiments, addressing the limitation presented in paragraph 4.5. Analyzing the results of the questionnaires, it will be possible to assess whether AR/VR technologies represents a potential vehicle for the promotion of cruises and shore excursions.

In addition, the results coming from the Questionnaire for User Interaction Satisfaction will be useful to evaluate the interactions between the users and the application in terms of usability. These data will also allow to identify shortcomings related to the interface, the application and/or the use and to address future improvements of the whole application.

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