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**Citation:** Surgenor, D., Hollywood, L., Furey, S., Lavelle, F., McGowan, L., Spence, M., Raats, M., McCloat, A., Mooney, E., Caraher, M. and Dean, M. (2017). The impact of video technology on learning: A cooking skills experiment. *Appetite*, 114, pp. 306-312. doi: 10.1016/j.appet.2017.03.037

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**Link to published version:** <http://dx.doi.org/10.1016/j.appet.2017.03.037>

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38 **Abstract**

39 With the decrease of cooking from scratch in the domestic setting and the increasing use of  
40 broadcasting technologies to promote cooking, this study seeks to examine the role of video  
41 technology in assisting the cooking process in the home. The study explored the views of 141  
42 female participants on their perceptions of video technology as assisting the cooking specific  
43 food and recipes. Participants took part in a cooking experiment to assess the most effective  
44 methods of learning for low-skilled cooks across four experimental conditions (recipe card  
45 only; recipe card plus video demonstration; recipe card plus video demonstration segments,  
46 conducted in stages; and recipe card plus video demonstration ‘free access video  
47 demonstrations). Focus group discussion followed immediately after the cooking task  
48 wherein participants reflected on their use of video technology to assist the cooking process.  
49 Findings revealed that video technology promoted the cooking process in the following ways:  
50 (1) visualisation of the cooking process; (2) reassurance during the process; (3) replication; of  
51 the process (4) flexibility to work at your own pace; and (5) selective access to the video  
52 where required. Key learnings across all four conditions identified that individuals perceived  
53 video technology to be most effective when: (1) experiencing a new cooking skill and (2)  
54 reinforcing a more advanced technical skill. These findings display the potential for video  
55 technology to enhance cooking skills among low-skilled individuals wishing to cook a meal  
56 from scratch using fresh ingredients.

57 **Key Words**

58 Cooking skills, cooking confidence, technology, mobile digital technology, video, cooking  
59 demonstration.

60

61



## 63 **1.0 Introduction**

64 Research indicates that video's facility to listen repeatedly to information is likely to be a  
65 mediating factor in reinforcing learning through increased motivation and engagement (Mc  
66 Kinney et al., 2009). Video provides individuals with the opportunity to control the speed and  
67 the pace of information being presented, allowing them to process the content more  
68 effectively, before more information is presented and lost (Walls et al., 2009). Although there  
69 has been extensive research around technology and skills development, to date there are few  
70 studies on the impact of video technology on cooking skills development and engagement in  
71 the domestic environment .

72

## 73 **1.2 Societal Changes in Domestic Cooking**

74 Convenience has emerged as a key factor in consumer food choice, and many social and  
75 environmental factors have contributed to a decline in time spent in the kitchen (Jackson and  
76 Viehoff, 2016, Pula et al., 2014, Caraher and Lang, 1999) Industrialisation, urbanisation,  
77 commercialisation and social change have converted the social and economic landscape  
78 globally and in the UK where financial and lifestyle changes have resulted in changing eating  
79 patterns (Utter et al., 2016). There is evidence of a changes in traditional eating habits, a  
80 greater availability of high energy, ready-made convenience foods, and eating outside the  
81 home more often, with resulting over consumption (Jackson and Viehoff, 2016).  
82 Correspondingly/concomitantly there has been an escalation of consumer spending in the  
83 convenience food sector correlating with a lack of cooking skills (Mintel, 2010; Mintel,  
84 2016; Jabs and Devine, 2006), where lower end-cost, pre-packaged convenience meals are  
85 generally energy-dense, high in fat and salt and low in micronutrients and fibre which  
86 inevitably contribute to dietary inequalities and ill-health. In recent decades the focus of

87 policy makers and health promotion professionals has been the conservation of domestic  
88 cooking skills through health campaigns to promote awareness and the facilitation of  
89 community cooking interventions to develop knowledge and skills albeit without an adequate  
90 or robust evidence base to support such initiatives (Reiks et al., 2014; Rees et al., 2012).  
91 Cooking skills interventions have become a popular tactic used to improve diet quality  
92 among the general population. In addition, policy debate has promoted the merits of cooking  
93 skills interventions to deliver wider public health policy solutions (Garcia et al., 2014;  
94 Condrasky and Helger, 2010). However, upon a review of the literature to date on cooking  
95 skills interventions, few studies have incorporated the use of digital technologies to support  
96 the development of individual cooking skills.

97

## 98 **2.2 The Use of Digital Technology in Promoting Domestic Cooking Skills**

99 Research into the effectiveness of video in enhancing learning has revealed wide ranging  
100 benefits in terms of cost as well as meeting the learning requirements of the digital native  
101 (Prensky, 2010). Prensky (2010) contends that digital natives are used to receiving  
102 information at speed, preferring to parallel and multi-task, therefore the flexibility of video  
103 using portable devices may offer more efficient learning (Lim, 2005). Indeed there has been  
104 an increased emphasis on the use of digital technology to promote skills development through  
105 use of video across social media platforms and smart phone Apps (Comiskey, 2010; Whatley  
106 and Ahmed, 2007). Videoed cooking demonstrations and those presented on television, have  
107 tended to facilitate the full process, step by step, and often with some spoken information on  
108 for example the sourcing of fresh local ingredients or nutritional facts concerning the dish  
109 being created. Current thinking however suggests that as educators, it is necessary not to  
110 simply replicate steps and stages of a process but to consider the needs and learning



111 requirements of the audience in order to fully engage and motivate them. Therefore it is  
112 necessary to consider what environmental changes must be introduced to best meet the needs  
113 of the intended target audience. Watson (2006) states;

114

115 *“We spend a lot of time trying to change people. The thing to do is to*  
116 *change the environment and people will change themselves”*

117 (Watson, 2006 p24).

118

119 For most individuals, the digital device itself, for example, a smart phone or tablet, is close at  
120 hand with rapid internet access; and as more people choose portable devices to access this,  
121 the way in which they acquire their information has and continues to change (Ericsson,  
122 2010). Several studies have utilised small screens, such as iPods (Kellems & Morningstar,  
123 2012; Rayner, 2011; Murray and Olcese, 2011) and handheld computers (Cihak, Kessler, and  
124 Alberto, 2008) as electronic prompting devices. Regardless of the differences in tasks and  
125 materials, video in these studies has been found to be effective in developing a range of skills.  
126 Few studies to date have specifically addressed the use of video technology to improve  
127 cooking skills.

128

### 129 **2.3 How Digital Technology Impacts on Learning**

130 Wishart (2016) contends that visualisation is especially relevant in understanding key  
131 concepts, and the visual nature and audible content of video serves as a substantial learning  
132 tool. Indeed according to Mayer’s (2001) cognitive theory of digital learning, an individual’s  
133 information processing system is separated by cognitive channels to differentiate visual and auditory  
134 stimuli. Learning is accessed by integrating the information from these separate channels suggesting  
135 that learners can process only a limited amount of information at any given time. This is highlighted

136 through empirical research, which found that if a large amount of visual and verbal stimuli  
137 are offered simultaneously, the learner experiences cognitive overload and cannot reach  
138 maximum understanding of the content (Mayer, 2001). However, because video offers the  
139 functions of repeated access and control of the speed and pace of the verbal and visual stimuli  
140 offered, cognitive overload is decreased. Therefore, using video technology to teach cooking  
141 skills has the potential to improve learning, engage individuals in the cooking process and  
142 have a positive influence on diet quality. The aim of this study is to gain greater  
143 understanding of individuals' perceptions of using digital technology, specifically video  
144 technology, to assist the cooking process.

145

### 146 **3.0 Research Context: Cooking Skills**

147 The data presented in this paper is part of a larger study addressing the impact of cooking and  
148 skills and the role of technology in the promotion of cooking and their influence on the  
149 healthiness of diets in adults aged 20-60 years. Quantitative data was collected via a  
150 nationally representative consumer survey to measure cooking and food skills on the IOI and  
151 investigate their relationship with socio-demographic and psychological factors. Qualitative  
152 techniques (interviews, experiment and focus groups) explored individual behaviours and use  
153 of cooking skills. The data reported here is part of larger study involved a mixed methods  
154 approach using qualitative and quantitative techniques on the island of Ireland. This paper  
155 presents the qualitative findings of the focus groups which followed the cooking experiment.

156

### 157 **3.1 Sample**

158 One hundred and sixty participants were recruited to take part in the cooking experiment [40  
159 participants x four experimental conditions]. All were selected using specific recruitment

160 criteria: (a) female; (b) cook for a family; and (c) consider themselves as low-ability cooks.  
161 The final sample consisted of 141 participants across 16 focus groups. A total of 21  
162 participants withdrew from the study for various reasons (e.g. unexpected commitments, non-  
163 attendance and illness). The sample size of each experimental condition is described as  
164 follows: condition one (n=34); condition two (n=33); condition 3 (n=35) and; condition 4  
165 (n=39).

166

### 167 **3.2 Methodology**

168 To explore individual perceptions of video technology on cooking skills, a cooking  
169 experiment followed by a focus group discussion was used. Within the experiment  
170 participants were asked to prepare a lasagne using fresh ingredients, and were categorised  
171 into four experimental conditions. Condition 1 (control group) involved use of a recipe card  
172 only. Condition 2 permitted participants to watch a video demonstration of the cooking  
173 process in advance (plus use of a recipe card). Condition 3 included video segments of the  
174 cooking demonstration, where the full demonstration was divided into steps (plus use of a  
175 recipe card). Participants were asked to watch each video segment then enact it, before  
176 moving onto the next step. Lastly, Condition 4 involved unrestricted access to the video (plus  
177 use of a recipe card) where participants could access the video as and when required. This  
178 paper will focus specifically on the results of the focus group discussion wherein participants  
179 reflected on their use and perceptions of the video technology used in the experiment. Each  
180 focus group discussion was based on the appropriate experimental condition therefore only  
181 one experimental condition was discussed in any given focus group.

182

### 183 **3.2 Procedure**

184 Data were collected in 16 focus groups facilitated at Ulster University, Coleraine and St.  
 185 Angela’s College, Sligo and facilitated by an experienced moderator (DS). Each focus group  
 186 began with an ice-breaker activity requesting participants to introduce themselves and state  
 187 how often they cooked from scratch. The moderator then provided instruction on ground  
 188 rules of the focus group discussion (e.g. not talking over each other, the importance of  
 189 confidentiality) before proceeding to a series of guided open-ended topics. Results from the  
 190 literature review and data from an earlier round of interviews from the larger study informed  
 191 the development of the focus group topic guide (Table 1). Each focus group was conducted  
 192 immediately after the cooking experiment, lasted between 50 and 65 minutes and was audio  
 193 recorded. An assistant moderator (FL) was also present to take notes to help focus the  
 194 discussion. At the end of each focus group, participants were thanked and an honorarium of  
 195 £60 (60 Euros) was paid and a free copy of a *safe*food cookbook given to each participant for  
 196 their time and to remunerate the travel costs of study participation.

197

198 **Table 1 Outline of the focus group topic guide**

Topic	Description	Aids/Activities	Duration
Introduction	<ul style="list-style-type: none"> <li>Facilitator introduction</li> <li>Boundaries of the focus group and contracting including recording consent</li> </ul>		5 minutes
Confidence Levels	<ul style="list-style-type: none"> <li>What was your perceived confidence ability in cooking lasagne from scratch prior to the task?</li> <li>Has this confidence changed as a result of the experiment?</li> </ul>	Participants may use pre survey and post self-evaluation sheets	5 minutes
Evaluation of dish	<ul style="list-style-type: none"> <li>Individual perception of taste and appearance of the finished dish - How does it taste?</li> <li>Comparisons with group participants’ dishes?</li> <li>Is this what was expected in terms of ability and taste of the finished dish?</li> </ul>	Check dishes in oven and serve Taste testing Participant taste testing evaluation sheet.	20 minutes
Barriers/Facilita	<ul style="list-style-type: none"> <li>How challenging did you find the</li> </ul>	Demonstration	10 minutes

tors to cooking from scratch	<p>task? What were the most/least challenging aspects of the task?</p> <ul style="list-style-type: none"> <li>• What would encourage/discourage you to cook using fresh ingredients at home?</li> <li>• What additional barriers do you consider prevent you from cooking this or a similar dish in the home environment?</li> </ul>	of portion costing card	
Identification of skills used	<ul style="list-style-type: none"> <li>• What skills can you identify in cooking lasagne?</li> <li>• Do you consider these skills achievable in your home?</li> <li>• Which skills did you consider most challenging?</li> <li>• Would you practise these to enable you to cook this or a similar dish at home?</li> </ul>		5 minutes
Use of technology	<ul style="list-style-type: none"> <li>• Do you have home access to the internet?</li> <li>• Do you use the internet to assist with learning practical skills?</li> <li>• Can you think of an example?</li> <li>• Group 1 – Do you consider the task as more/less challenging because of lack of visual demonstration?</li> <li>• Groups 2-4 – How do you consider technology to have assisted/hindered learning?</li> <li>• Groups 2-4 – Are there aspects of this form of learning which you consider particularly useful?</li> <li>• Would you consider using technology to assist with home cooking?</li> <li>• What part do you consider technology can play in promoting cooking from scratch in your own homes?</li> </ul>		10 minutes
Transferability of skills/learning to the home setting	<ul style="list-style-type: none"> <li>• Considering the skills you identified earlier - Can you think of other meals where you might incorporate skills developed today, or different ingredients for example you may like to change or incorporate ingredients to make the dish healthier or more preferable for the family's taste?</li> </ul>		5 minutes
Summary and ending	<ul style="list-style-type: none"> <li>• What would you do differently next time?</li> </ul>		

199

### 200 **3.3 Analysis**

201 All discussions were digitally recorded, professionally transcribed and uploaded to the  
202 qualitative analysis software Nvivo 10 (QSR International Pty Ltd, Victoria, Australia). An  
203 inductive coding approach was used to identify a comprehensive set of evolving codes to: (1)  
204 summarise the raw data and (2) establish links between the research aim and the raw data.  
205 Using a sample of two transcripts initial codes were generated independently by two  
206 researchers (DS and LH) and discussed in a process of triangulation for the purposes of  
207 developing a codebook to be applied to the remainder of the data. To ensure inter-coder  
208 reliability, a further three transcripts were coded and agreed. Codes were then grouped  
209 together to form potential themes in relation to the aim of the study. Verbatim quotes are  
210 displayed with the day, focus group number, experimental condition and the location in  
211 which the focus group was held, respectively, following in parentheses.

212

## 213 **4.0 Results and Discussion**

214 Results are presented using two broad perspectives between and across experimental  
215 conditions.

216

### 217 **4.1 Condition 1 - control group (recipe card only)**

218 Within this experimental condition participants did not have access to a video demonstration  
219 or images of each stage of the cooking process, only written information on a recipe card  
220 with a small thumbnail picture of the lasagne. The reported outcomes of Condition 1  
221 indicated that the text-only recipe did enable the participants to produce an end product;  
222 however those who had not experienced this process before lacked confidence and expressed  
223 concerns with certain technical (cooking skills) aspects of the recipe.

224

225           *“I suppose, with the white sauce, you think you’re doing it wrong*  
226           *with the recipe card. I’ve not made it before so I lobbed the milk in*  
227           *too quickly. If you’d seen it being done first you’d know you were*  
228           *doing it wrong before you went ahead. Yeah, if you want to learn*  
229           *something new, even, it’s good to see how other people do it.” (2, 2,*  
230           *1, R.O.I.)*

231

232 In addition participants discussed their ability to visualise the end product (lasagne) but  
233 struggled to visualise certain steps and stages within the recipe (béchamel sauce).  
234 Subsequently, participants suggested that a sequence of images reflecting each stage of the  
235 process would have been more helpful than written text instruction.

236

237           *“I have made it from scratch but I’ve never made the cheese sauce*  
238           *from scratch, so that was an experience! I kind of found, as I was*  
239           *going through, I hadn’t a clue if I was doing it the right way. I think*  
240           *you’d need to see what the end product is supposed to look like after*  
241           *the meat, then the cheese sauce. Especially through the cheese sauce*  
242           *even if you had pictures.” (2, 1, 1, N.I.)*

243

244 Wishart (2016) contends that visualisation is important in understanding key concepts, and as a result,  
245 emphasised the visual nature of video as a beneficial learning tool. This condition lacked the  
246 visual aspect of outlining the steps involved in the cooking process and participants  
247 highlighted this where they reported a lack of visual expectation in terms of what was  
248 required from them in completing each stage of the task. Results underlined the importance

249 of visualisation in developing confidence and reassuring the participants that they were  
250 following the cooking process correctly.

251

#### 252 **4.2 Condition 2 - Video demonstration - (watch full video before task + recipe card)**

253 Within this experimental condition participants watched the video demonstration in advance  
254 and had access to the recipe card. The outcome of Condition 2 revealed that the majority of  
255 participants positively perceived the video technology, specifically discussing how it  
256 improved their technical skills required in béchamel sauce making. While results indicated  
257 that viewing the video in its entirety prior to the experiment led to an increased inability to  
258 recall all of its content, participants did discuss how they retained specific images in key  
259 stages of the experiment. This result was particularly evident during the sauce making  
260 process, offering reassurance of following the correct process.

261

262 *“I forgot exactly what to do when I came to make it, but I*  
263 *remembered that the sauce was supposed to look really thick to start*  
264 *with, so I knew I did it right.” (3, 2, 2, R.O.I.)*

265

266 *“I probably wouldn't have been able to do it unless I'd watched the*  
267 *video first because I would have thought I'd have made a mess of it*  
268 *and given up. ... When you remembered back to the video you*  
269 *realised you were ok.” (3, 1, 2, N.I.)*

270

271 The majority of participants within this condition expressed a preference to follow recipe text  
272 rather than instruction via video however this may have been due to their prior experience of  
273 making a bolognaise sauce consequently not finding this part of the video beneficial.



274 However, results did highlight the significance of visualisation in the development of cooking  
275 skills. In this instance, individuals did consider seeing the demonstration prior to beginning  
276 the experiment beneficial for anticipating that certain stages within the cooking process were  
277 being completed correctly.

278

#### 279 **4.3 Condition 3 - Video demonstration (watch each segment then cook + recipe card)**

280 Within this experimental condition, participants watched a total of five segments of the video  
281 demonstration in pre-determined stages while cooking the recipe and had use of the recipe  
282 card. The outcome of this condition demonstrated that the majority of participants positively  
283 perceived the video in terms of the staged sequencing of the cooking process. Participants  
284 were aware of how the consistency of the béchamel sauce should appear once prepared,  
285 however were uncertain of what the viscosity should be throughout the stages of the sauce-  
286 making process. Watching the video offered them a visual expectation of the cooking process  
287 and provided them reassurance that they were following each stage of the cooking process  
288 correctly.

289

290 *“I can’t remember what it was but I got a video on how to prepare*  
291 *fish because I didn't know where to start, and you could do it in*  
292 *stages like we did today by stopping and starting it ... You could see*  
293 *exactly what to do, and follow it.” (3, 3, 3, N.I.)*

294

295 In addition, results indicated that the step-by-step sequencing reduced the need to recall  
296 aspects of the recipe as they simply followed the video in real time.

297

298                   *“You can pause it where they’re at and catch up, so you're not having*  
299                   *to remember things.”* (1, 2, 2, N.1.)

300

301 Results indicated that this real time step-by-step process also allowed participants to work at  
302 their own pace by stopping and starting the video as and when needed.

303

304                   *“I’d watch it first when I’m trying to figure out what I’m doing.... I’ll,*  
305                   *you know, look and research and, you know, watch it to see if I think I*  
306                   *can do it, and then when I’m doing it I’d, you know, watch it and*  
307                   *pause it as I go along then.”* (3,1,2, R.O.I.)

308

309 While this condition did show an overall positive effect of technology on cooking skills and  
310 practices, results revealed some negative reactions to its use. Participants who had previous  
311 experience in making a bolognaise sauce found viewing some of the steps within the process  
312 time-consuming and off-putting.

313

314                   *“It was a pain having to watch the rest of it though...it made me run*  
315                   *out of time.”* (1, 1, 3, N.I.)

316

317 Participants also discussed how the step-by-step video instruction illustrated the amount and  
318 speed at which ingredients should be incorporated throughout each step of the cooking  
319 process.

320

321                   *“It gave me more guidance, as you’re saying, with each step; now*  
322                   *have I done this right or am I adding the milk at the right times, you*  
323                   *know, or am I adding too much milk too quickly?” (1, 1, 3, R.O.I.)*

324

325   This condition offered visualisation and reassurance of the cooking process in real-time  
326   through watching the steps of the video in sequence. Watching the video in stages helped to  
327   prevent cognitive overload (Mayer, 2001). In addition, participants considered that the skills  
328   demonstrated in the video made it easier for them to replicate during the experiment.  
329   However, the ability to replicate key skills was only viewed as valuable when undertaking a  
330   new skill for the first time (e.g. sauce-making) or a more complex skill which typically they  
331   did not practise on a routine basis.

332

#### 333   **4.4 Condition 4 - Video demonstration (watch video segments as required + recipe card)**

334   Within this experimental condition, participants watched the segmented video cooking  
335   demonstration and had use of the recipe card as and when required. Results displayed similar  
336   findings to those of Conditions 2 and 3 in relation to the use of technology for the purposes of  
337   visualisation. However, by allowing participants the flexibility of selecting which steps to  
338   view as and when required, as many times as they required (selectivity), this resulted in  
339   participants utilising the video to meet their individual needs.

340

341                   *“You can rewind it, you can just put it on pause; I like dipping in and*  
342                   *out when I need it.” (1, 2, 4, N.I.)*

343

344                   *“I’d probably have it running in the background as an audio while I*  
345                   *do something else, and just listen to what I need.” (2, 3, 4, N.I.)*

346

347 Results showed that the majority of participants were familiar with making the bolognaise  
348 sauce so chose not to watch the steps relating to this stage in the recipe. However, this did not  
349 apply when undertaking the steps relating to the sauce-making. Walls et al. (2009) contend  
350 that an important learning aspect of video technology is the facility to pause, rewind and  
351 repeat. This ensures that participants may process video content more effectively, before  
352 more information is presented and lost. Indeed according to Mc Kinney et al. (2009) the  
353 ability to repeatedly watch and listen to video reinforces learning, promoting further  
354 motivation and engagement. Some participants discussed how they viewed only the steps  
355 relating to the sauce-making and that they viewed these steps more than once to ensure a  
356 successful outcome. Individuals highlighted that, in terms of learning a new skill, the visual  
357 nature of the video together with the facility to reinforce key aspects of sauce-making served  
358 to reassure and engage them in the process.

359

360 *“I was able ... I just wanted to see what my cheese sauce looked like*  
361 *compared to the girl's in the video. I just used one bit of that video,*  
362 *the sauce really, because I make spaghetti all the time and didn't*  
363 *need the video then.” (1, 2, 4, N.I.)*

364

365 Again, findings or accounts from respondents were similar to Conditions 2 and 3 whereby  
366 technology was beneficial to those carrying out a new skill for the first time (sauce-making).  
367 Similarly, results revealed that participants who had no experience of preparing a béchamel  
368 sauce suggested that the visual impact of the video was important in terms of anticipating  
369 what the sauce should look like at each step of the process, as well as reassuring them that  
370 they had replicated an acceptable consistency.

371

372 Condition 4 demonstrated the importance of visualisation, flexibility and selectivity in using  
373 technology while cooking. It is now recognised that simply replicating the steps and stages of  
374 a process is not sufficient to engage the target audience. Consideration should be given to the  
375 learning needs and requirements of a range of individuals within that target audience.  
376 Therefore in order to meet these needs, as educators, it is necessary to make changes to the  
377 learning environment (Watson, 2006). Results suggested participants experienced the benefit  
378 of having the freedom to view the segments of the demonstration they needed as often as they  
379 needed throughout the experiment. Therefore in order to engage and motivate the audience to  
380 develop and learn new cooking skills, perhaps it is more beneficial to offer individuals the  
381 option to select relevant parts of the process of which they are unfamiliar, as a result  
382 promoting self-determination, empowerment and a person-centred approach to learning.

383

#### 384 **4.5 Summary of experimental conditions**

385 Findings highlighted that the majority of individuals perceived the video technology  
386 positively in aiding the cooking process, in particular where new or more technical cooking  
387 skills was required.

388

389 Focus group results suggested that technology assisted the cooking process in the following  
390 ways: (1) visualisation of the process and final product; (2) real-time reassurance of  
391 individual progress; (3) replications of cooking skills; (4) flexibility to work at your own  
392 pace; and (5) selective access to the video as and when required. While visualisation and  
393 reassurance were deemed important to the control group these were not discussed specifically  
394 in relation to the video technology used within the experimental task but rather imagery (or  
395 photographs) of the stages within the recipe. In contrast however, Condition 4 demonstrated

396 that all the benefits considered helpful in the cooking process were present in Condition 4.

397 All five benefits are summarised across each experimental condition in Table 2.

398

399 **Table 2 Benefits of technical assisted cooking across experimental conditions**

400

Identified Benefit	Condition 1	Condition 2	Condition 3	Condition 4
Visualisation				
Real-time reassurance				
Replication				
Flexibility				
Selectivity				

401

402

403 Key learnings across all four conditions identified that individuals perceived the video

404 technology to be most effective when: (1) learning or applying a new cooking skill; and (2)

405 reinforcing a more advanced technical skill. More specifically, this occurred when

406 participants were asked to make a béchamel sauce with which they were unfamiliar meaning

407 the majority of participants relied on the use of the video technology to assist them. Table 3

408 displays the stages of the sauce-making process shown in both the text and video  
 409 demonstration and describes how the visual nature of the video supports skills development.

410

411 **Table 3 Stages of sauce-making**

Stage of Process	Text instruction on recipe	Additional visual actions as seen in the video – not available on recipe card
1	Melt the fat	<ul style="list-style-type: none"> <li>• No stirring, fat not bubbling and fat becomes transparent</li> </ul>
2	Add the flour and cook for 1 minute	<ul style="list-style-type: none"> <li>• Visualisation of the expected texture of flour and fat mixture</li> <li>• Visualize the speed at which flour was added</li> </ul>
3	Take off the heat, place on a pot stand and stir in the milk slowly	<ul style="list-style-type: none"> <li>• Visualisation of the gradual addition of milk</li> <li>• Reassurance of the dense, gloopy almost “doughy” consistency</li> <li>• After all the milk is added the appearance is like thin custard</li> </ul>
4	Return to the heat and bring to the boil	<ul style="list-style-type: none"> <li>• Visualisation of vigorous stirring to a smooth consistency</li> </ul>
5	Reduce to simmer until the sauce coats the back of the wooden spoon	<ul style="list-style-type: none"> <li>• Visualisation of a smooth consistency; no lumps</li> <li>• The demonstrator lifts spoon out of sauce to leave a trail, coating the back of the wooden spoon</li> </ul>

412

413 For the majority of participants, sauce-making was deemed a new skill. A number of  
 414 participants suggested that, without the video, they would have disposed of the sauce at the  
 415 stage when the flour was added to the fat and cooked.

416

417 *“That’s my first time making the sauce, so if I hadn’t seen the video,*  
 418 *mine would have been thrown in the bin at the point before you add*  
 419 *the milk because it just looked wrong. I paused it too and did a bit,*  
 420 *then it was easier.” (1, 1, 3, N.I.)*

421

422           *“No, if it was home I’d have thrown it in the bin, just no: I’d have no*  
423           *patience. The only thing was the girl on the video made it and I saw*  
424           *hers was like the way mine was, so I went on ahead with it and it*  
425           *turned out ok.” (1, 2, 4, N.I.)*

426

427 The “gloopy” consistency (at stage 2) was unfamiliar with the smooth viscosity typical of a  
428 finished béchamel sauce. Therefore through watching the video, participants conceptualised  
429 the thick and “doughy” appearance of the batter and felt reassured to continue cooking. In  
430 contrast, participants from Condition 1 (recipe card only) did not have access to the visual  
431 aspect of the stages in sauce-making and expressed lesser reassurance at this stage of the  
432 process.

433

434           *“I thought I had made the cheese sauce wrong: when I added the*  
435           *flour and the butter it just went to mush. I thought no...and then I*  
436           *started looking over at somebody else’s... you have to add milk yet,*  
437           *because I thought that was it.” (2, 1, 1, N.I.)*

438

439 These results highlight how video technology assisted participants in visualising the  
440 consistency of the sauce at each stage of the process, which in turn reassured them to  
441 continue the cooking process.

442

443 Where more technical skills were introduced into the cooking process, or where the end  
444 product would be adversely affected by mistakes and trial and error would be unacceptable,  
445 video technology was described as helpful. Therefore adapting the learning environment  
446 (Watson, 2006) empowered individuals by promoting self-determination in selecting the



447 sections of the video most important to them, and this subsequently encouraged confidence,  
448 motivation and engagement. For example, the majority of participants throughout Conditions  
449 2, 3 and 4 discussed how they used the video technology to assist them in the sauce-making  
450 process.

451

## 452 **5.0 Conclusion**

453 It is clear that video technology has a place in supporting some people to cook from scratch.  
454 Video technology, due to its flexibility and the ability to utilise at one's own discretion  
455 (selectivity), further served to reassure and reinforce the key cooking skills required to  
456 achieve a successful meal outcome. The results from this study provide evidence of the  
457 potential to rely on the scalability of video technology to redress the current cooking skills  
458 imbalance among the general population.

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