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(Article begins on next page)
Cavazza et al. 2012

Interactive Storytelling

VP cases to teach physician-patient interaction, communication and empathy.  

Descriptive

Medical students in USA.

None.  None.  Development of SG described.
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<th>Authors</th>
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<td>Duque et al.</td>
<td>2008</td>
<td>The Virtual Home Visit</td>
<td>VE of a patient’s home, teaching about geriatric home visits. Timed, with distractors. Learners identify risk factors for falls/harm.</td>
<td>Quasi-experimental</td>
<td>Medical students in Australia; n=56.</td>
<td>Pre/post MCQ, survey.</td>
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<td>Evans et al.</td>
<td>2014</td>
<td>Septis</td>
<td>CBS about sepsis and shock. Used triage test and treat several patients at once, timed. Physiology modeled.</td>
<td>Quasi-experimental</td>
<td>Medical students; residents in USA; n=156.</td>
<td>Pre/post MCQ, satisfaction and survey.</td>
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<td>Fonseca et al.</td>
<td>2015</td>
<td>e-Baby</td>
<td>VE of an incubator, teaching clinical evaluation of preterm infants’ respiratory process. Embedded multimedia assets to share within a Moodle course.</td>
<td>Survey</td>
<td>Nurses, nursing students in Australia; n=14.</td>
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<td>Gleason et al.</td>
<td>2015</td>
<td>Research &amp; Evidence Learning in Medicine</td>
<td>Timed CBS with text-based PICO exercises.</td>
<td>Descriptive</td>
<td>Medical students in USA.</td>
<td>None.</td>
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<tr>
<td>Grafland et al.</td>
<td>2014</td>
<td>Medialis</td>
<td>VE with CBS with MQC augmented with multimedia. Learners diagnose and manage patients with biliary tract disease.</td>
<td>Validation study: performance vs. skill level</td>
<td>Surgeons, trainees in Netherlands; n=41.</td>
<td>Performance during SG: Noisor of solved cases.</td>
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<tr>
<td>Grafland et al.</td>
<td>2013</td>
<td>Situational Awareness in Surgical Training Game</td>
<td>CBS with text questions augmented with multimedia, teaching management of equipment-related errors.</td>
<td>Quasi-experimental</td>
<td>Surgeons, trainees, n=45.</td>
<td>Usability and satisfaction survey.</td>
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<td>Grafland et al.</td>
<td>2014</td>
<td>Laparoscopic Equipment Failure Serious Game</td>
<td>VE simulating a minimally invasive surgery (MIS) unit, testing learner’s assessment and management of equipment settings and displays.</td>
<td>Validation study: comparison of performance vs. skill level</td>
<td>Surgeons, trainees, MIS equipment specialists in Netherlands; n=45.</td>
<td>Performance during SG: Number of solved cases.</td>
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<td>Hanning et al.</td>
<td>2012</td>
<td>eMedOffice</td>
<td>VE simulating design of a medical office for optimizing patient care.</td>
<td>Quasi-experimental</td>
<td>Medical students in UK; n=41.</td>
<td>Pre/post self assessment, survey.</td>
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<td>Hashimoto et al.</td>
<td>2015</td>
<td>LapMentor VR</td>
<td>VE simulating laparoscopic cholecystectomies.</td>
<td>RCT: competitive SG vs. control SG (C)</td>
<td>Medical students in UK; n=18.</td>
<td>Time, movements, instrument path length, global rating scale.</td>
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<td>Jalink et al.</td>
<td>2014</td>
<td>Underground world</td>
<td>VE: learner destroys and rebuilds mine using 2 Wii Remote controllers in laparoscopic tool shells. Trans basic laparoscopic skills, not medical knowledge.</td>
<td>Quasi-experimental</td>
<td>Laparoscopic surgeons at a global conference; n=72.</td>
<td>Speed within SG, satisfaction survey.</td>
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<td>Janssen et al.</td>
<td>2015</td>
<td>They Know: Anatomy</td>
<td>Multi-player adventure competition, advancement with correctly answering questions about human anatomy.</td>
<td>Survey</td>
<td>Medical students in Australia; n=16.</td>
<td>Satisfaction survey, open-ended interviews.</td>
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<td>Kazczynsny et al.</td>
<td>2015</td>
<td>Video-based VE teaching and testing acute management of tachyarrhythmias</td>
<td>Survey</td>
<td>Medical students in UK; n=47.</td>
<td>Satisfaction survey, open-ended interviews.</td>
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<tr>
<td>Kanthan, Senger et al.</td>
<td>2011</td>
<td>The Path is Right</td>
<td>Testing VE with multimedia for teaching clinical pathology. MOC, fill-in the blank, and extended matching options.</td>
<td>Quasi-experimental</td>
<td>Medical students in Canada; n=77.</td>
<td>Pre/post test: midterm vs. final exam scores.</td>
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<td>Katz,</td>
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<td>Central Venous</td>
<td>VE for performing central venous</td>
<td>Descriptive</td>
<td>Residents, None.</td>
<td>None.</td>
<td>Development of SG and future studies described.</td>
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</table>
Demana et al. 2013  Catheter Game  catheter placement.  students in USA.  

Keerfoot et al. 2014  Spaced-repetition (SE) blood pressure (BP) control game  Competitive MCQ game, learners recorded MCQs at regular intervals and relative scores posted to foster competition among peers. BP recordings of hypertensive patients were evaluated.  RCT: SG vs. control (identical content online)  Primary care clinicians in USA; n=111.  Pre/post MCQ at 14 weeks, time to BP target in hypertensive patients.  5, 7  Higher post-test scores in SE group vs. control group (90% [SD 8] vs. 78% [SD 19], respectively; Cohen d 0.8, p<0.001). Median time to BP target in 17,685 hypertensive periods was decreased in SE vs. control groups (142 vs. 148 days, p=0.018). Hazard ratio for time to BP target in SE group was 1.043 (95% CI, 1.007–1.081; P=0.018). The number of hypertensive episodes needed to treat to normalize one additional patient’s BP was 67.8. The number of clinicians needed to teach to achieve this was 0.43.  

Keerfoot, Baker et al. 2012  Urology Content Game  Competitive MCQ game on core urology content. 2 MCQs with feedback emailed daily. MCQ recorded in 2 or 6 weeks if answered correctly. MCQs have been associated with neurological problems, with patients learning and managing patients. Embedded videos.  Quasi-experimental  Urology residents in USA and Canada; n=531.  Baseline scores and completion rates in SE compared with standardized exam scores.  1, 2, 3  Baseline scores (median 62%, interquartile range [IQR] 17%) correlated with scores on 2008 American Urological Association in-service examination (ISE08, ISE09). 2009 American Board of Urology qualifying examination (ISE09) (p=0.76, 0.46, and 0.64, respectively; all p<0.001). Baseline scores varied by gender, country, degree, and training year (all p<0.001). Completion scores (median 100%, IQR 2%) correlated with ISE08 and ISE09 scores (r =0.35, r=0.001 for both). Median completion score was 100% (IQR 2%). Completion scores varied by training, ranging from a median 99% (IQR 4%) for year 1 to 100% (IQR 1%) for year 4 residents (p<0.001). 72% surveyed requested future SE games.  

Keerfoot et al. 2012  SE Pre-Clinical Content Game  Competitive MCQ game on pre-clinical content, 2 MCQ with feedback emailed daily. MCQ recorded over time and relative scores posted to foster competition.  Quasi-experimental  Medical students in USA; n=731.  Baseline scores and completion rates within SE.  1, 2, 3  Median baseline score was 53% (IQR 16) and varied significantly by year (p<0.001, max =2.08), school (p<0.001, max =0.75), and gender (p<0.001, max =0.38). Median completion score was 93% (IQR 12) and varied significantly by year (p=0.001, max =1.12), school (p>0.001, max =0.34), and age (p=0.019, max =0.43). Scores did not differ significantly between years 3 and 4. 70% surveyed requested future SE games.  

Keerfoot et al. 2012  SE Continuing Medical Education Guidelines Game  Competitive MCQ game on urology guidelines. 2 MCQ with feedback emailed daily. MCQ recorded over time and relative scores posted to foster competition.  RCT: 2 MCQs every 2 days, vs. 4 MCQs every 4 days  Physicians world-wide; n=1470.  Baseline scores and completion rates within SE.  1, 2, 3  Median baseline score was 48% (IQR 17), and median completion score was 98% (IQR 25). SE students performed worse than 2 MCQ every 2 days (d = 0.43, p<0.001). 76% of participants requested to participate in future SE games.  

Kizakevich et al. 2007  Sim-Patient™  VE with single and multiple-casualty cases (bioterrorism, trauma, improvised explosive device). Learners apply triage tags and manage cases. Physiology modeled.  Survey  Military physicians in USA; n=31.  Survey.  1, 2, 3  Surveyed participants rated simulated realism and navigation a mean of 4.40 (out of 5, SD 0.43), simulation content and responsiveness 4.42 (SD 0.04), simulation learning content 4.41 (SD 0.20).  

Knight et al. 2010  Triage Trainer  VE of major incident scenario where users perform medical checks, tag and assess multiple patients.  RCT: SG vs. C (card sort exercise)  Physicians, nurses, paramedics in UK; n=91.  Post testing with live simulation.  5  Significantly improved lagging and step accuracy for SG vs. C group (Chi2 = 13.126, p<0.002; Chi2 = 5.45, p=0.019). No difference in time to triage between the two groups (456 ± 62 s vs. 435 ± 74 s, p=0.155).  

Kupenov et al. 2009  Burn Center  Mass bomb blast casualty disaster VE. Learners simulate.  Descriptive  Trauma surgeons, nurses, therapists in USA.  None.  None.  Positive correlation between training with Burn Center and performance in a traditional lectured course.  

Lagro et al. 2014  GeriatriX  Geriatric clinic VE. Users care for VP with fatigue due to iron-deficiency anemia. Users scored on appropriateness and cost-efficiency of care.  RCT: SG vs. C (self-study)  Medical students in Netherlands; n=134.  Pre/post MCQ, confidence survey.  2, 1, 3, 5  Significantly higher post-test scores for SG vs. C in cost consciousness (cost deviation: 13.5 +/- 3.6 vs. 15.4 +/- 3.6, p<0.005). Significantly higher self-perceived knowledge in SG vs. C group for appropriateness/ cost of care (effed sizes 1.0, and 1.2). No difference for geriatric content. Most felt SG was clear (3.9/5±0.8), enjoyed it (4.0/5±0.9), wanted to finish the SG (4.0/5±0.9), considered it a safe environment (4.1/5±0.8), and felt it increased knowledge (3.9/5±0.8). Some users were not satisfied with clarity (2.3±1.0) and feedback (2.6±1.0).  

LeBoy et al. 2008  Virtual ED II  Multiplayer VE with cases simulating Sarin exposure or radioactive bomb blast. Communication through microphone. Physiology modeled.  Survey  Physicians, nurses in USA; n=13.  Satisfaction survey.  1, 2, 3  62% reported a change in their feelings about working in an ED team. Mean ratings showed users felt immersed (3.47/6) and the SG increased confidence in ability to respond to trauma (2.00/5 before SG; 3.08/5 after SG). Most thought the SG would be useful for learning teamwork (mean = 3.77/5) and clinical skills (mean = 3.15/5). Comments indicate users perceived the SG as realistic.  

LeBoy et al. 2008  Peninsula City  Multiplayer VE of a triage area after an explosion. Communication through microphone.  Survey  Paramedics, physicians, nurses in USA; n=16.  Satisfaction survey.  1, 2, 3  75% and 96% of participants thought the SG was useful for refresher training and initial training, respectively. 62% thought the SG was as/more effective vs. traditional methods.  

Lim et al. 2008  eNLG (online Neurological Localization Game)  Modified essay and MCQ of patients with neurological problems, with learners examining and managing patients. Embedded videos.  Survey  Medical students in Singapore; n=76.  Satisfaction survey.  1, 2, 3  93.4% of participants felt that the eNLG helped them better understand neurological localization principles, 90.7% believed the question-based format was suitable, 96.1% liked the use of videotaped vignettes, and 98.6% requested more eNLG scenarios in the future. 42.1% felt the eNLG could replace regular bedside teaching.  


Lin et al.**  
2015  
SICKO  
(Surgical Improvement of Clinical Opgs)  
Same game format as Sespris (above), but with timed surgical CBS. Learner triages and prioritizes care, decides whether or not to operate, makes intraoperative decisions.  
Validation study: comparison of performance vs. skill level  
Medical students, residents and surgeons in USA; n=49.  
Performance during gameplay compared across skill level, survey.  
1, 2, 3, 4  
Mean total SG scores for the novice, junior resident, senior resident, and expert groups were 5,461; 8,519; 11,404; and 13,913, respectively (p = 0.001). Usability survey results were positive, with mean scores ranging from 3.52 to 4.28 across ten questions.

McKenzie**  
2013  
Game Informed Online Learning About Managing Aggression in Health Settings  
Informed learning activity with VP scenarios involving aggression and balance of tasks in a healthcare setting. Embedded multimedia tools including video clips and external websites.  
Comparison trial, not randomized: SG vs. control (didactic 90-minute teaching session)  
Clinical psychology students in UK; n=68.  
Case-based pre/post testing, self-reported confidence, usability survey.  
1, 2, 3, 5, 6  
Knowledge scores increased significantly following training in SG (t=5.646, df=34, p<0.001) and control group (t=0.13, df=30, p=0.90). A split plot ANOVA illustrated a significant interaction effect between group and time: F(1,64)=11.11, p=0.001, g2p=0.148, large effect size. Post-test scores vs. pre-test scores significantly higher for control vs. SG group. Confidence scores increased significantly following training in both SG (t=4.345, df=34, p<0.001) and control group (t=-4.842, df=30, p=0.001). Mean educational activity rating scores for both groups were positive, but the control had significantly more positive scores than SG group in perception of learning tool as: interesting, (t=3.654, df=41.88, p<0.001) easy to follow (t=3.14, df=37.12, p=0.003).

Moham et al.**  
2014  
ED Physician Decision Making  
VE, users evaluate and manage cases simulating a busy ED shift. One version contained distracting cases and other audiovisual distractors. Timed, physiology modeled.  
RCT: SG with distractors (cognitive load, CL) vs. SG without distractors (control, C)  
Emergency physicians in USA; n=209.  
Performance during game: transfer to trauma center, number of orders entered, time spent, CT scan rates.  
4, 5  
C was significantly more likely to appropriately transfer severely injured, hemodynamically unstable, and younger patients to trauma centers than CL group (40% vs 25% CL, p<0.01; 49% vs. 28% CL, p=0.01; 44% C vs. 27% CL, p=0.01). Same average number orders entered (10.9 C [SD 4.8] vs. 10.7 CL [SD 5.6], p = 0.74), but less time spent per case in SG group (9.7 C [SD 7.1] vs. 11.7 C [SD 6.7], min, p<0.01). No difference in transfer of representative cases reliant on heuristics (45% C vs. 34% CL, p<0.20). Higher transfer of non-representative cases for C group (38% C vs. 26% CL, p=0.03). Overall physician transfer rates (31%) and CT scan rates (62%) were consistent with rates reported in literature for actual clinical practice (30%, 57%, respectively).

Moule et al.**  
2015  
VPs for cancer nursing education  
VE simulation scenarios to teach nursing topics in caring for men with prostate cancer.  
Survey  
Nurses, students  
Survey.  
1, 2, 3  
The majority of respondents reported an increase in knowledge and suggested that they would recommend the resource to others.

Nicolaidou et al.**  
2015  
Virtual Emergency Telemedicine (VETM) Game  
VE simulating cardiac emergencies through a telemedicine system.  
Survey  
Ambulance crew nursing personnel in Cyprus, n=90.  
Survey.  
1, 2, 3  
Along tested domains (user interface, difficulty level, feedback, educational value, user engagement, terminology), means ranged from 3.2 to 3.95. Analysis of log files showed a low success rate (20.6%). Participants described educational value and usefulness of the SG for pre-emergency training (mean 3.93, SD 1.05), but identified confusing features and provided input for improving them.

Nosek et al.**  
2017  
Cancer Genetics Tower  
VE, users progress through levels and complete patient-based tasks.  
Survey  
Medical students in USA; n=17.  
Survey.  
1, 2, 3  
Participants rated the SG: excellent (10/17), good (9/17), or average (1/17). Participants found the quality of the graphics acceptable, and felt the SG held their interest. 14/17 felt the SG was helpful in learning the content and would be interested in using it more if content was added. Some found the speed of download too slow.

Ojetti et al.**  
2012  
GRAPHIC (Games Research Applied to Public Health with Innovative collaboration)  
CBS, learners work collaboratively and individually to explore population oral health and the evidence for community initiatives, care for simulated 5-year-old patient in an inner city environment, Moodle.  
Survey  
Dental students in UK; n= not provided.  
Survey.  
1, 2, 3, 6  
Positive feedback, not described. Learning outcomes achieved with all participants successfully passing the game. The software used in the construction of the game limited certain aspects of the interaction of the participants with the game.

Vanipuran et al.**  
2014, 2014  
ACLS Virtual Reality Simulator  
Multiplayer hospital VE, learners communicate via microphone with members (or a team randomly assigned to role) and perform ACLS on VP. CPR simulated via joystick. Two games with differences in amount of feedback (persuasion) given.  
Two RCTs: Persuasive (P) vs. minimally persuasive (MP) SG. Control (didactic) vs. P vs. MP. SG.  
ACLS-certified physicians in US; n=98*; n=148.  
Survey.  
Usability survey.  
1*, 2, 3, 5*  
Higher mean usability (p=0.0944) and ease-of-use (p=0.0813) scores in MP compared to P. No difference in post-intervention performance control vs. P (p=0.37 for pulseless electric shock (PES) and p=0.10 for ventricular fibrillation & ventricular tachycardia (VFib/Vtach)). No difference in performance in P vs. MP (p=0.01 for PEA, p=0.63 for VFib/Vtach). Significant difference in performance in control vs. MP (p=0.05 for PEA and p=0.02 for VFib/Vtach). The pre-post comparison of performances of the groups showed that control (p=0.017 for PEA, p=0.01 for VFib/Vtach) and P (p=0.02 for PEA, p=0.048 for VFib/Vtach) groups improved their performances significantly, whereas MP group did not (p=0.45 for PEA, p=0.46 for VFib/Vtach).  

Qin et al.**  
2010  
Stopping the Fountains pre-game + Virtual Orthopedic-Surgery Game  
Operating room VE, learners manipulate surgical tools via haptic device. VP present with varying degrees of blood loss, users assess and manage. Physiology modeled.  
RCT: SG with and without pre-training elements Orthopedic surgeons, students in China; n=21.  
Performance within SG: Time to complete blood management tasks.  
5  
SG with pre-training group outperformed SG without pre-training group in both completion time (p=0.01 by Wilcoxon-Mann-Whitney test and p=0.006 by Kruskal-Wallis test) and performance score (p=0.001 by Wilcoxon-Mann-Whitney test and p<0.001 by Kruskal-Wallis test).

Rondon et al.**  
2013  
Anatesse 2.0 Quiz  
Interactive MCQ with multimedia, teaching anatomy and physiology of the spine, language, hearing, and swallowing mechanisms.  
RCT: SG group vs. control (self-study) Speech Language & Hearing students in Brazil; n=29.  
Pre/post MCQ, re-test at 6-months.  
5, 6  
Pre-test scores were significantly lower vs. pre-test and long-term post-test scores. No significant differences between the groups’ post-test scores (p=0.176). When isolating specific topics within the assessment, SG group had significantly higher Anatomy (p=0.001) post-test scores. Pre- vs. long-term post-test scores indicated significant differences only for control group (p=0.042). No significant difference in post-test vs. long-term post-test scores.
<table>
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<th>Reference</th>
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<th>Setting</th>
<th>Setting Description</th>
<th>Study Population</th>
<th>Design</th>
<th>Outcome Measures</th>
<th>Findings</th>
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<tr>
<td>Schwaab et al.19; 2006</td>
<td>Second Life (SL) Case-Based Mock Emergency Medicine Board Examination</td>
<td>Hospital and examination room VE, learners manage cases, communicate via microphone with a faculty examiner at a remote computer (virtual patient). Mock oral American Board of Emergency Medicine examination.</td>
<td>Survey, participants given traditional oral exam prior to SG exam</td>
<td>Emergency residents in USA, n=27.</td>
<td>Satisfaction survey, comparing user experience with SL examination and oral examination.</td>
<td>1, 2, 3</td>
<td>Participants rated SL as: easy to log into (92.6%) and navigate (96.3%), fair (100%), objective (100%), conducted efficiently (100%), and realistic (92.6%). 70.3% found it more realistic than the traditional oral examination (70.3%). Participants felt comfortable communication with examiner via remote computer (100%). A majority preferred oral examinations via SL over oral examination and expressed interest in using SL for other educational experiences (66.6% and 92.6%, respectively).</td>
</tr>
<tr>
<td>Schwarz et al.17; 2013</td>
<td>Medical Faculties Network (MEFANET)</td>
<td>Timed CBS in basic life support, emergency, anesthesiology, pain, and critical care, with embedded multimedia. Physiology modeled.</td>
<td>Survey</td>
<td>Medical students in Czech Republic, Slovakia, n=62.</td>
<td>Satisfaction survey.</td>
<td>1, 2, 3</td>
<td>87% of participants agreed or strongly agreed that the SG was an effective tool for learning, 81.4% agreed or strongly agreed that the SG increased knowledge in acute medicine, 74% agreed or strongly agreed that the SG was a better way to study than textbooks, 87% agreed or strongly agreed that the embedded multimedia along with timed stress factor evoked a clinical atmosphere, 85.2% agreed or strongly agreed that they liked using the interactive algorithms at home and in a classroom setting.</td>
</tr>
<tr>
<td>Schwi et al.17 2001</td>
<td>Anesthesia Simulator 3.0</td>
<td>VE, learners examine and treat patients during anesthetic emergencies. Physiology modeled.</td>
<td>RCT: SG vs. C (self-study)</td>
<td>Anesthesiologists residents in USA, n=31.</td>
<td>Post testing with live simulation.</td>
<td>5</td>
<td>Significantly higher post-test score for SG vs. C group (52.6 ± 9.9 vs. 43.3a 5.9, p&lt;0.004).</td>
</tr>
<tr>
<td>Stredney et al.17 1996</td>
<td>Virtual Simulated Epidural Anesthesia</td>
<td>Hospital VE of a simulated patient’s back, for practicing epidural placement, with computer-generated needle.</td>
<td>Survey</td>
<td>Anesthesiologists residents in USA, n=3.</td>
<td>Survey/questionnaire.</td>
<td>1, 2, 3</td>
<td>Participants felt that the interface was comfortable to very comfortable to use, interface was straightforward to use. Participants reported the SG was “too mechanical,” movements were “stiff.” Comments for improvement included: need for additional visual cues for orientation, introduction of a method to angle the needle.</td>
</tr>
<tr>
<td>Sward et al.17 2008</td>
<td>Pediatric Rotation Game</td>
<td>Testing environment of a web-based, interactive adaptation of an existing board game for general pediatric content.</td>
<td>RCT: SG vs. C (self-study)</td>
<td>Medical students in USA, n=100.</td>
<td>Post-rotation NBME Pediatric Clerkship Exam scores, satisfaction survey.</td>
<td>1, 2, 3, 5, 6</td>
<td>No difference in NBME exam scores, comfort with content (p&gt;0.68), readiness for exam (p=0.52), content presented with enough detail (p=0.17), content relevant to patients (p=0.77), or user questions answered (p=0.47) between groups. 94% felt that SG visuals were attractive. Mean overall reaction to the SG score was 6.5/9 (SD=0.97). SG favored vs. self-study in understanding content (p&lt;0.001), perceived help with learning (p=0.05), and enjoyment of learning (p=0.008).</td>
</tr>
<tr>
<td>Tukel et al.17 2015</td>
<td>Zinc Phosphate Cement Virtual Learning Object</td>
<td>Moodle-based VE teaching and testing handling of zinc phosphate cement for dental prostheses.</td>
<td>RCT: Longitudinal SG (15 days) vs. SG (20 minutes) vs. longitudinal reading vs. reading (C)</td>
<td>Dental students in Brazil, n=46.</td>
<td>Pre/post MCQ and laboratory skill tests.</td>
<td>1, 2, 3, 5</td>
<td>No significant difference in MCQ post-test scores between groups (p&gt;0.40). 75% of SG and 86% of C group reported a change in their feelings about ED teams. 88% of SG and 93% of C group felt immersed. 56% of SG and 78% of C group rated themselves as “confident or very confident” in leading an ED team. Most subjects found their modality “useful” or “very useful” for learning clinical skills and teamwork (100%, 94% SG; 100%, 100% C).</td>
</tr>
<tr>
<td>Youngblood et al.17 2008</td>
<td>Virtual ED</td>
<td>Multiplayer emergency room VE, users examine and treat patients with a team. Users communicate through microphone. Physiology modeled.</td>
<td>RCT: SG vs. C (live simulation)</td>
<td>Medical students, residents in USA, n=30.</td>
<td>Pre/post testing with live cases, satisfaction survey.</td>
<td>1, 2, 3, 5</td>
<td>No significant difference in post-test scores between groups (p=0.40). 75% of SG and 86% of C group reported a change in their feelings about ED teams. 88% of SG and 93% of C group felt immersed. 56% of SG and 78% of C group rated themselves as “confident or very confident” in leading an ED team. Most subjects found their modality “useful” or “very useful” for learning clinical skills and teamwork (100%, 94% SG; 100%, 100% C).</td>
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</tbody>
</table>

Abbreviations: SG = serious game, C= control, VE = virtual environment, VP = virtual patients, CBS = case-based simulation, RCT = randomized controlled trial, MCQ= multiple choice questions, SUS= System Usability Scale, s= seconds.